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POSITIVE CEPHALIN-CHOLESTEROL FLOCCULATION TEST IN X-RAY WORKERS*

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Since its conception in 1938 the Hanger Test (Cephalin-Cholesterol Flocculation Test) (1) as modified by Neefe and Reinhold (2) has become generally recognized as probably the best of all screening tests in active disease of the liver parenchyma (3). Its chief advantages lie in its reliability, sensitivity and simplicity of technique. It is helpful in the differential diagnosis of jaundice due to biliary obstruction and hepatogenous jaundice. Degree of flocculation is known to parallel the severity of the active parenchymatous liver involvement and therefore the test has prognostic value in estimating the extent and persistence of the active process (4). The studies of Rosenberg (5) indicate that routine use of the cephalin-cholesterol method may yield a surprising incidence of mild and sub-clinical disease of the liver. It is Hanger's belief that the mechanism of the flocculation test "probably depends upon the capacity of an altered globulin constituent of the serum to become affixed to the colloidal elements of the emulsion."

It is well established that emulsions from mixtures of sheep brain cephalin and cholesterol are not flocculated by normal human serum and seldom by serum from patients without liver disease. In a certain control series, recently, using three volunteer x-ray workers (of apparently normal health) it was observed that all gave heavily positive tests. None of the workers had knowledge of present or past liver disease. It was this accidental finding that led to further observations on this subject.

The purpose of this presentation is to produce evidence that

* Second Award Paper. Read before A.S.M.T. Convention, June 1948.

a high percentage of x-ray workers was found to have positive cephalin-cholesterol tests. The sera of the original group were used as controls in the routine performance of the Hanger test.

METHODS

Preparation of the Test Antigen Emulsion: The Hanger method requires care in preparation and storage of the test antigen emulsion. A thoroughly clean and dry Erlenmeyer flask (125 cc. volume) is used. With the flask on a level plane a permanent mark is made at the 30 cc. level. Into the prepared flask 35 cc. of distilled water are placed and this heated to 60°-70° C over a water bath. From the stock solution (5 cc. of anesthetic ether to one unit of Difco antigen) add 1 cc. of antigen slowly with constant stirring. The mixture is allowed to simmer until the final volume is reduced to 30 cc. which corresponds to the permanent mark on the flask. During the heating all coarse, granular clumps should be dispersed, resulting in a stable, milky, translucent emulsion from which all traces of ether are driven off. This is called the "test antigen." The antigen preparation is now ready to be cooled, stoppered and placed in the refrigerator, each new preparation being dated. When the antigen is cold it is ready for use. In our experience such a preparation will keep for only 6-7 days; after this false positives are noted. It is routine in our laboratory to prepare fresh test antigen each week. The stock antigen, however, when well stoppered will keep for several months at 6°-8° C.

Performance and Interpretation of the Hanger Test: The routine procedure as originally described by Hanger is as follows:

(1) Place 4 cc. of normal saline (0.85% Na.Cl.) in a clean centrifuge tube.
(2) Add 0.2 cc. of the serum to be treated to the saline solution.
(3) Add 1 cc. of test antigen emulsion and shake thoroughly.
(4) Stopper the tube with cotton and allow to stand at room temperature (dark room).
(5) Note the flocculation and precipitation that have taken place at the end of 24 and 48 hours.

A +4 reaction indicates a complete precipitation leaving the supernatant liquid water-clear. Graduations of the reaction between negative and +4 are designated in terms of +1, +2, +3. A negative result should not be reported until 48 hours have elapsed without flocculation.

In performing the routine test three tubes are set up for each group:

Tube 1: A control using a known positive or negative with antigen and saline added.

Tube 2: The patient's serum with antigen and saline added.

Tube 3: Antigen and saline only.

This is done, of course, to determine if the antigen is sound. Fresh serum is used routinely as plasma is unsatisfactory because of the anti-coagulants.

In a more recent publication Neefe and Reinhold (2) pointed out photo-sentitivity as a cause of falsely positive flocculation reactions. Hanger and Mateer have confirmed these observations. They recommend that the test antigen emulsion and the serum be protected from light, that the serum-saline-antigen test mixture be incubated in the dark at room temperature (20°-25°C) and also that the patient's serum should not be diluted until the test is to be performed.

Twenty-eight x-ray workers with experience varying from 4 months to 20 years have been tested for degree of cephalin-cholesterol flocculation. Thirty-four controls were used.

RESULTS

Patient	Age Sex	Time in X-Ray	Ceph. 24 Hr.	—Chol. 48 Hr.	Gastro-Intestinal Symptoms	Jaundice	Liver Tenderness	Liver Enlargement	Splenic Enlargement
C. B.*	F-26	7 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg.	Neg.
N. B.*	F-40	4 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg.	Neg.
J. C.*	M-35	5 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg.	Neg.
J. W.	M-25	4 mos.	0	0	Neg.	Neg.	Neg.	Neg.	Neg.
E. S.	F-19	4 mos.	0	+3	Neg.	Neg.	Neg.	Neg.	Neg.
W. S.	M-27	10 mos.	0	0	Neg.	Neg.	Neg.	Neg.	Neg.
E. G.	M-24	5 yrs.	0	0	Neg.	Neg.	Neg.	Neg.	Neg.
O. G.	M-26	18 mos.	+2	+4	Neg.	Neg.	Neg.	Neg.	Neg.
L. V. T.	F-35	13 yrs.	0	+2	Neg.	1918	Neg.	Neg.	Neg.
R. M.	F-30	1 yr.	+1	+2	Neg.	Neg.	Neg.	Neg.	Neg.
E. J.	M-45	18 mos.	0	0	Neg.	Neg.	Neg.	Neg.	Neg.
J. C.	F-23	12 mos.	0	0	Neg.	Neg.	Neg.	Neg.	Neg.
R. A.	M-30	2 yrs.	0	+2	Neg.	Neg.	Neg.	Neg.	Neg.
J. B.	M-25	1 yr.	0	+1	Neg.	Neg.	Neg.	Neg.	Neg.
M. W.*	F-43	10 yrs.	+1	+3	Neg.	Neg.	Neg.	Neg.	Neg.
R. C. D.	M-30	3 yrs.	0	+2	Neg.	Neg.	Neg.	Neg.	Neg.
I. W.	F-21	16 mos.	0	+1	Neg.	Neg.	Neg.	Neg.	Neg.
E. A.	F-20	16 mos.	0	+1	Neg.	Neg.	Neg.	Neg.	Neg.
J. B. G.	M-33	1 yr.	+1	+4	Neg.	Neg.	Neg.	Neg.	Neg.
L. G.	F-24	1 yr.	0	+2	Neg.	Neg.	Neg.	Neg.	Neg.
A. J.*	F-36	10 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg.	Neg.
N. A.	F-30	8 yrs.	+2	+3	Neg.	Neg.	Neg.	Neg.	Neg.
B. B.*	M-28	6 yrs.	+3	+3	Neg.	Neg.	Neg.	Neg.	Neg.
G. K.*	F-26	2 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg.	Neg.
D. K.*	M-50	15 yrs.	+2	+2	Neg.	Neg.	Neg.	Neg.	Neg.
B. C.*	F-55	20 yrs.	+2	+2	Neg.	Neg.	Neg.	Neg.	Neg.
A. H.*	F-23	2 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg.	Neg.
D. Mc.*	M-47	15 yrs.	+4	+4	Neg.	Neg.	Neg.	Neg	Neg.

* Repeated at least twice with same results.

Thirty-four controls were used, four of which were positive (+2 to +4); three of the four had definite gastro-intestinal symptomatology; one of whom had a positive Graham test of

the gallbladder. No known cause could be ascertained for the remaining positive test.

Discussion: A review of the literature reveals no previous information as to the effect of the roentgen ray on the liver as detected by the cephalin-cholesterol flocculation test. The above findings show 20 of 28 x-ray workers with at least a +2 positivity (71%) and 23 of 28 (82%) with some degree of positivity. In general the length of time exposed to the x- ray paralleled the degree of positivity of the test, but there were definite exceptions. There were no significant positive findings among the group as to gastro-intestinal manifestations, jaundice (with one exception), liver tenderness or enlargement, or splenic enlargement.

The factors responsible for the alteration of the x-ray worker's liver to produce positive cephalin-cholesterol flocculation tests are as yet incompletely worked out.

Conclusion: A high percentage of x-ray workers in a small group of 28 was found to have positive cephalin-cholesterol flocculation tests. The exact cause of this has as yet not been determined.

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SEMEN ANALYSIS FROM THE ANGLE OF THE CLINICAL LABORATORY

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The medical technologist has another new and interesting field of study viz. the examination of spermatozoa in seminal fluid. Because of its recognized diagnostic value in solving the problem of childless marriages, this examination will sooner or later become a matter of clinical laboratory routine. In certain phases it is already routine in some laboratories. For centuries it has been the contention that the wife's sterility was the cause of this childless marriage. It is only recently the medical profession has learned that in numerous instances the husband is at fault.

The author's work in the Duluth Clinic Laboratory, Departments of Gynecology, Obstetrics and Urology has enabled her to study approximately 75 cases in which seminal fluid was analyzed. It has given her an opportunity to corroborate the findings of workers in this field including Robert Hotchkiss, M. D., John MacLeod, Ph.D., G. L. Moench, M. D., Bernard Pinck, M. D., and Jesse Kishim, M. D.

The busy physician, who has not the time himself to make the examination of the seminal fluid, must rely on the medical technologist to perform the complete examination. It is therefore exceedingly important that the medical technologist avail herself of every possible opportunity to become familiar with this type of examination.

For obvious reason, the doctor gives the patient instructions for collecting the specimen to be examined. In earlier days the specimen was brought to the doctor in a condom, wrapped in a cloth (usually Turkish toweling) and carried in an inner pocket to keep the specimen at body temperature. Even with these precautions, oftentimes most of the spermatozoa were non-motile when the specimen reached the laboratory. It was learned that the rubber as well as the talc on the condom were responsible for killing the spermatozoa. To remedy this, it was found, after some experimenting that spermatozoa remained motile for several hours if the seminal fluid was collected and kept in a small porcelain jar such as an ointment jar. A small glass jar may be substituted if a porcelain jar is not available. The only precaution necessary is that it be kept at room or body temperature. The specimen should be delivered to the laboratory as soon as possible and as previously stated, wrapped in cloth and carried in an inner pocket in transit. Some doctors, however prefer to obtain the specimen in their offices whenever possible. Since the time element is essential in the study of motility (a criterion for

determining life in the specimen) it is imperative that the time of collection be clearly marked on the label of the specimen jar.

Macroscopically a normal specimen of seminal fluid appears as a white opalescent gelatinous mixture, changing to a fluid within approximately fifteen minutes. This being true, the following observations and tests are made immediately: Color, viscosity, volume and pH. Microscopically, the specimen is examined for motility, a cell count is made, and the morphology and tinctorial characteristics are studied.

As already stated the normal color of seminal fluid is an opalescent white, but it becomes translucent on standing. Its viscosity is variable, the significance of which is not fully understood. The volume is normally is about 2-4 cc. There are variations from this volume and these are more apt to be on the lesser side because of an incomplete specimen. The pH is normally about 7.8.

For motility study a hanging drop preparation is made by transferring a small drop of the fluid to a microscopic slide with a small glass rod and coverslipping at once. This preparation is studied under high power. Various fields are counted and the number of motile spermatozoa are recorded in one column but grouped separately as aggresive or sluggish, and the non-motile in another column. A ratio is struck between the motile and non-motile and expressed as a percentage. With the specimen kept at room temperature repeat counts are made at 3-hour intervals throughout the day—an argument for having the specimen arrive in the early morning—and a final 24-hour check. Specimens with 20-30 percent non-motile spermatozoa or with a preponderance of sluggish sperms in the initial preparation may greatly impair or prevent conception.

Subsequent preparations may show the following deviations in ratio between motile and non-motile.

PLATE I

60-100+ Million Sperm per cc.	Specimens Kept at Room Temperature			
	Initial Spec.	3 Hour	6 Hour	24 Hour
Total Percent Motility	80-95%	80-95%	25-40%	15-20%
Aggressive	85-90%	80-90%	10-15%	0-.5%
Sluggish	10-15%	10-20%	85-90%	90-100%
Abnormal	5-15%			

When the sperm count fell below 60 million per c.c., the percentage of motility varied greatly with usually an increase in non-motile sperm and with also an increase in abnormal types. *Count:* The spermatozoa count is made on the specimen after it has liquefied and has been thoroughly shaken. A white blood pipette and a Neubauer blood counting chamber are used. The diluent may be either a saturated solution of sodium bicarbonate fortified with 1 per cent phenol as preservative; or, a 4 per cent boric acid solution fortified with 1 per cent phenol. As in a white blood cell count the seminal fluid is drawn up to the mark 0.5, and the diluent to bring the total volume to the mark 11. After thorough shaking, approximately 50 per cent of the contents are discarded from the pipette and counting chamber is loaded. The count is made in the "red area," as for a red cell count, i.e. 80 small squares are counted. Since the cell count is expressed in sperms per cubic centimeter, it is obvious that if "n" represents the number of cells counted, affixing 6 ciphers to "n" takes care of the dilution and volume factors. A normal minimum "n" is considered to be 60,000,000 per cubic centimeter. Counting techniques vary, some authorities advising 3 separate counts from the same pipette, and taking the average; but the more prevalent technique is making three separate counts—using in each instance a different pipette, and averaging the three. Variations must remain well under 10 per cent—anything approaching 10 per cent should be discarded. This is a strong argument for taking up the count only after the specimen has liquefied.

V X N = Total spermatozoa count, where "v" equals the volume in c.c. of fluid and "N" the number per cubic centimeter. The total count is essential to the physician for determining subsequent therapeutic measures.

Morphology. This is determined from stained smears. In the author's experience it is advisable to make smears from both centrifuged and uncentrifuged specimens. In abnormally low counts centrifuged specimens are of definite advantage. Smears should be reasonably thin for two reasons—the cells become more easily discernible and, in the effort to make the smear thin in the process of spreading, the spermatozoan clumps become disentangled. The same technique is used as in preparing a blood smear with the same precautions. The stained smears are examined for morphology under oil with the immersion lens.

Normally the spermatozoa consists of a head, neck, intermediary body and a tail. The head, which is approximately 4.5 micra in length, consists of the cell proper made up of a nucleus, which in contour follows the shape of the head filling approximately the lower third. The upper two-thirds consist of the acrosome or apical body. The neck is a relatively short body joining the

head and intermediary body. It bears structures described in their names as anterior and posterior knobs. The posterior knob affects the motion of the tail. The intermediary body is an elongated structure connecting the main segment of the tail with the neck, and containing spiral fibers surrounding an axial thread. All this is possessed in a sheath. The intermediary body terminates in end rings. From the end rings extends the tail which consists of the main segment, a portion consisting of axial threads surrounded by a capsule and beyond this extends a short noncapsulated terminal filament. The total length of this "tail" is about 10 times the long axis of the head or approximately 50 micra.

To stain the preparation a number of techniques are used. Kishim and Pinck[1] apply MacNeal tetrachrome stain for 3 minutes, then differentiate with distilled water for 2 minutes. In this technique the nucleus stains blue and the acrosome, body, neck, and tail a striking pink.

Hotchkiss describes a number of stains which may be used, some of which dissolve the mucus before staining.[2] When special stains are not available, satisfactory slides can be prepared by fixing the smear in the direct flame and applying Gram's staining technique. In the normal preparation the nucleus usually stains gram-positive, while the acrosome and other structures stain gram-negative. In some instances the nucleus as well as the other structures of the spermatozoon stain gram-negative. This may be true when the seminal fluid is on the acid side of the isoelectric point; or the spermatozoa have with age undergone variations similar to those ascribed to bacteria, and lost their staining affinity. Be that as it may, authorities are not agreed on an explanation.

Now as to morphological findings on a stained smear. John MacLeod finds that morphological abnormalities, i.e. defects in the spermatozoon seem to increase as the count drops below 100,000 per cubic centimeter.[3] According to Moench[4] abnormalities of the sperm head are the most important changes. He lists among these abnormalities a distinctly narrow head and a rounded head tapering at the base, as the most significant changes. Furthermore he feels that in any given specimen it must be considered an abnormality not to find all the heads more or less the same size.

Other head abnormalities of note include the giant head—a very much enlarged head; the pin-point head, which as its name implies, is extremely small; double heads on one body possessing one tail and double heads on two bodies with a common tail.

Body and tail abnormalities in some spermatozoa consist of sperms with two or more tails but one body and one head; two

tails with two bodies and one head; extremely coiled tails, and abnormally long tails.

At times sperms may be found with no intermediary body. The cause for this is yet unknown. Other abnormalities are the so-called amorphous spermatozoa, and occasionally headless spermatozoa. In some instances patients have no spermatozoa whatever in their seminal fluid. This lack of cells is called azoospermia.

Certain chemistries have been evaluated on the seminal fluid, including sugar and phosphatase, and the fluid has been found to contain large amounts of sulphur. Much is as yet unknown as to the complete chemical contents of the seminal fluid.

The same chemical cleanliness of glassware is necessary for semen smears as for blood smears. In centrifuging the specimen, conical shaped test tubes are to be preferred. The specimen is centrifuged approximately 3-4 minutes at 3000-4000 revolutions per minute. The supernatant fluid is decanted and thin smears made of the sediment mixed in the adherent drops of fluid by gently thumping the tip of the cone against the palm of the hand.

Pus cells and bacteria found in stained seminal fluid smears are always noted.

The undesirable feature of a study of this is that with standing the fluid acquires a disagreeable odor. This is especially noticeable at the 24-hour check. The increasing odor is apparently caused by the changing of the pH of the seminal fluid.

In closing, it may be well to call the reader's attention to Kishim and Pinck's advice concerning seminal fluid analysis.[5] It demands meticulous skill to achieve good results; this only comes with repeated practice. Once technical skill is acquired there still remains the acquisition of understanding in interpreting findings. Though considerable advances have been made in using the clinical laboratory to help diagnose a cause for childless marriages, the whole secret of seminal fluid analysis is not yet known.

Summary: The analysis of seminal fluid in the clinical laboratory for the presence or absence of spermatozoa has been discussed. Salient features about the macroscopic phase of the study have been reviewed, viz.: color, volume, viscosity and pH. The technique for cell count was given and interpreted. A study of motility was discussed, and morphological features, both normal and abnormal enumerated.

* * *

Grateful acknowledgement is made to all those who aided me in the preparation of this paper.

PROBLEMS IN FERTILITY AS THEY PERTAIN TO THE MEDICAL TECHNOLOGIST

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The purpose of this discussion is not to add to what Miss Damgaard has said, but to present a few known facts as they pertain to practical clinical management of fertility studies in the male. This requires some appreciation of the normal anatomy and physiology of the male genital system. I will briefly review the anatomy of the male genital system, and as each portion is discussed try to give, very briefly, the physiology of that organ and the part it plays in the male genital system.

The male sexual apparatus may be divided into four parts: 1. The organs for production of sperm: the testes. 2. The organs for storage and conduction of sperm: the epididymides and the ductus deferentes. 3. The organs for mixing sperm with the vehicles to produce the semen: the prostate and seminal vesicles. 4. The organs for delivery of sperm: the penis and accessory glands.

1. The Testes. In the adult male the testes are stored in an efficient protective sac known as the scrotum. The testes are enveloped by the thick coat of tunica albuginea. The structural unit for spermatogenesis are the seminiferous tubules, each of which is from one to three feet in length, and each testes possesses from 300 to 600 of these tubules. The walls of these tubules are lined with germinal cells in a continuous process of maturation. During this process the cells develop as they pass from periphery toward the central lumen of the tubule. The Sertoli cells project radially into the lumen and are thought to supply nutriment to the germinal layers. During the process of spermatogenesis these germ cells are transformed into mature spermatozoa which are discharged into the lumen of the tubule.

The interstitial cells, which lie between the tubules, are believed to elaborate one or more male sex hormones. These internal secretions are thought to produce the drive by which transfer of union is made possible.

2. The epididymes and ductus deferentes. The exact function of the epididymes is unknown. Young believes it is necessary for the sperm to spend some time in the epididymes en route to the ductuc deferens if full maturity is to be permitted. In this conduit the sperm are in an acid media and Hartman believes they remain immobile here for long periods of time.

The ductus deferens is approximately 18 cm. long, and serves as a storage organ as the sperm move slowly through it. Its muscular coats suggests a propulsive peristalsis to help carry the sperm along.

3. The seminal vesicles and prostate. The seminal vesicles are two ovoid sacculated pouches about 5 cm. long, situated behind the bladder, and in front of the rectum. Their capacity is 4-6 cubic centimeters. Solutions coming from the ductus deferens pass into these vesicles. These secrete a yellow, viscid material of tapioca-like consistency. It is known that glucose is contained in the secretion, which is necessary for the life of the sperm, for if the sperm are removed from a specimen by centrifugation and resuspended in Ringer's solutions, this solution must contain at least 2- mg. per cent of glucose if motility of the sperm is to continue. Contrary to former belief, the seminal vesicles do not act as a storage space for sperm, as only a few are found in these vesicles at any one time.

The prostate is a five lobed gland assuming in the adult the shape of a horse chestnut. This is a compound tubular gland subdivided into follicles. The function of this gland other than affording a vehicle for spermatozoa, remains unknown. No hormone or reducing substance is produced by the prostate, so far as is known. We do know that it forms some of the secretion of the ejaculate—various figures are offered by different authors of from 55 to 70 per cent.

It is known that this gland enlarges with age either by enlargement of its glandular or fibromuscular elements and produces symptoms of prostatism, carcinoma, likewise, is a common neoplasm involving this gland.

Truthfully, we must admit that this third group of male genital organs is poorly understood. They serve as a mixing unit, but all the exact purposes of the elements produced by them is relatively unknown. This hiatus in knowledge is inconsistent with the remarkable discoveries and advances relative to other parts of the genital and urinary apparatus.

4. The penis and accessory glands. This fourth group of organs for the fertilization of the female has been spoken of as the delivery organs. The penis and urethra form the only part of the genital organs sharing a function with the urinary tract. The urethra is surrounded by a very vascular tissue called the corpora cavernosa, and the corpus spongiosum which extend back and are encased in the voluntary muscles of the perineum. The erection of the penis is afforded by distention of the blood spaces within these well demarcated bodies of tissue.

Other organs affecting the genital tract. It is known that the secretions of many other organs in the body affect the genital organs. For example: removing the adrenal glands, which lie above either kidney, causes loss of potency as well as degeneration of the seminiferous tubules. Giving excess of the adrenal principle, however, will not overstimulate gonad functions. The

greatest action of this gland is upon secondary sex characters, and it is well seen in women suffering from adrenal tumors who may develop masculinizing features, such as the bearded lady of the circus.

The pituitary gland, lying at the base of the brain, secretes hormones referred to as gonadotropins. Removal of this gland causes atrophy of the testes. Extracts of this gland, or pituitary gonadotropins, have the ability to stimulate and maintain the activity of the testes. These hormones may be found in the blood and in the urine of normal individuals.

The thyroid gland is linked to the endrocrine chain and some relationship exists between it and the organs of reproduction. It is known to become enlarged in women in puberty, during menstruation, and with pregnancy. In myxedema, or depressed functions of this gland, there is sexual depression in both sexes. Removal of this gland retards spermatogenesis.

I have only briefly mentioned a few of the organs which exert an influence upon the genital tract in man. This is to emphasize the fact that all problems in sterility are not simple, but may become very complicated, and a dearth of knowledge still exists.

Treatment: Briefly I will mention some things the physician must look for in the treatment of sterility. The first thing to note is the general condition of the patient. A complete history and physical examination are essential before any attempt to answer the complicated problems of sterility is undertaken. A history of venereal disease, infections, as prostatic abcess, operations, as for stricture of the urethra, trauma, diet, a history of the patient's marital life in detail, are some of the factors which demand investigation.

The type of work he does, and the average number of hours he works each day are important. Anxiety, fatigue and overwork are factors which are not fully understood, but when corrected have materially aided in increasing the incidence of pregnancy.

It is very important that the theme of likelihood of conception should dominate the expressed thought at all times. A psychological factor enters into the treatment of all of these cases. It is interesting to note how many couples, after adopting a child have had one of their own. I am familiar with seven such cases. The one which stands out in my own mind is the case in which a physician and his wife, after thirteen years of wedded life, adopted two children, and within less than a year later were blessed with twins of their own.

Routine laboratory tests, as blood count, urinalysis, and blood serology tests are done. If the serology is positive, the wife's blood is also examined. This necessitates therapy before further examinations or treatment for sterility are undertaken.

The blood counts are valuable, especially if the patient gives a history of working with X-ray, radium, or heavy metals, which tend to decrease the blood count and also the sperm count. Also, they help to rule out the possibility of other diseases.

A basal metabolic rate is desirable if the semen is found to be of low grade. In such cases where the B.M.R. is low, thyroid therapy may be effective in increasing the sperm count and the motility and longevity of the sperm.

After the routine history, physical examination, and laboratory tests are completed and evaluated, the semen is collected. This specimen is brought to the clinician's office in a clean jar within one hour of the time of collection.

Turbidity of the semen is important if it contains red blood cells, for this may mean pathology along the genital tract, as inflammation of the veru monatanum, in the region of the prostate gland, a bleeding stricture after dilatation by a sound, etc.

Viscosity has some importance, as in a very viscid sample the sperm may show poor motility. Some believe the sperm show virtually exhaustion when swimming in a viscid medium. Infection and poor drainage of the glands may be the cause.

Fresh semen has a gelatinous consistency, and after from five to ten minutes self liquefaction takes place and there is a shift to the more liquid state. This process is not fully understood. It may be the acid phosphatase, in the ejaculate which plays a part. Also, as mentioned previously, there are various sugars found in the semen, and these may be reduced to lactic acid as a result of metabolism of the sperm. Other unknown factors may enter into this liquefying process.

As liquefaction takes place the sperm becomes more motile. Heat will also promote activity of the sperm, but reduces longevity. Sperm left exposed to the heat of the lamp illuminating the microscope may be reduced in longevity, although they become more active.

If the specimen is very fresh, the portion of the material examined is important, as the initial forty per cent of the ejaculate contains approximately seventy five per cent of the spermatozoa. This is not an important factor to the technician, unless the sample is very fresh, since within ten minutes it liquefies, and is then easily mixed.

If the specimen submitted to the laboratory contains no sperm, various causes must be investigated. Infections of the prostate gland and seminal vesicles due to gonococci, tubercle bacilli, or the so-called non specific occlusion of the passageways.

Occlusions of these, high in the tract may allow only secretions of the prostate and seminal vesicles to escape without spermatozoa. Stricture of the urethra may allow no semen to

escape. Removal of the prostate gland, is done in older men because of hypertrophy (enlargement) with resultant urinary obstruction, may allow the ejaculate to escape into the bladder.

Subclinical infections of the prostate gland with hydrogen peroxide producing bacteria may cause irreparable damage to the spermatozoa, for three parts to one million of hydrogen peroxide have been shown to kill spermatozoa. The pneumococcus, hemolytic strephtococcus, gonococcus, meningococcus and certain stains of B. coli. make hydrogen peroxide. Therefore, the physician may ask for a culture of secretions obtained from prostatic massage. Accurate determination of the types of organisms present may be of definite importance in some cases.

Azospermia, the term applied to complete absence of sperm, may be due to a deficient or poorly developed germinal epithelium within the testes. This can be determined by taking a biopsy of the testicles and making a pathological diagnosis. It may be due to obstruction of the genital tract above the prostate gland, as mentioned above. Operations have been devised to correct some forms of obstructions.

Necrospermia is a term used to designate immotile spermatozoa. This is a poor term, as MacLeod has shown, for in some cases supplying the necessary substrate, such as glucose, of which sperms have been deprived, will initiate motility. This is a part of the rationale for advising a Ringer's glucose solution in the form of a vaginal douche for the female before coitus.

Oligospermia, or deficiency in the number of sperm, may, like azospermia be due to many factors, as heredity, nutrition, temperature, infections, neoplasms, circulation, previous irradiation, constitutional states of endrocrine imbalance. Structural defects as cryptorchidism, or undescended testicles, is invariably associated with absent or greatly reduced numbers of spermatozoa. The increased heat to which the testicles are subjected when retained in the body may be a factor. Often this condition can be corrected by surgery.

If there is proven to be poor spermatogenesis, the physician is then faced with an endrocrine problem. The available endrocrine substances for clinical usage in treatment are numerous and variable. Which hormone, or combination of hormones, to use becomes a complex problem. Proper dosage, length of time they should be used, and how frequently, are all problems which are not completely answered. However, many authors are agreed that definite improvement can be expected in a few cases, but responses are variable and cannot be predicted from case to case. At this time chorionic gonadotropins, pituitary gonadotropins, and thyroid substance have been favored. The administration of testosterone apparently has no ability to stimulate sperma-

togenesis in man. It causes enlargement of the seminal vesicles and prostate, as well as increase in production of seminal fluid when none are produced prior to the injection of the hormone.

In this discussion I have not attempted to select a definite topic, but to present some of the phases of sterility in an effort to familiarize you with some of the problems of the physician. I hope I may have answered some questions which will help you to better understand the problems of sterility in the male.

It is most important for the physician to have a carefully determined evaluation of each specimen. Much depends upon the medical technologist's report as to what procedures to follow in the order of diagnosis and treatment. The clinician also depends upon the laboratory work to determine progress of therapy. After the first semen specimen is examined and recorded, a second specimen from the same patient a month or two later will inform the physician as to the progress made by the therapy he has chosen to follow in each particular case. In each case the physician depends upon the work of the medical technologist.

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THE VALUE OF SEDIMENTATION RATE IN DIAGNOSIS OF ACUTE APPENDICITIS

JANE MAGHAN, M. T., *St. Lukes Hospital, Duluth, Minn.*

The sedimentation rate of erythrocytes is of great value in diagnosis of many diseases. To demonstrate how this test aids in the diagnosis of acute appendicitis, we have correlated the sedimentation rates with leukocytosis in 100 cases studied. These cases were admitted over a period of 18 months during which time the Cutler method was used. Only those cases with histologic evidence of acute appendicitis are included.

The value of the sedimentation rate in pulmonary tuberculosis is high.* The height of the reading is an accurate indication of the extent and activity of the pulmonary pathology. A patient with a normal sedimentation is said to have a good prognosis, but a case cannot be called arrested in the face of a rising sedimentation rate.

In pneumonia,** as in tuberculosis, the sedimentation rate is of great value. In the acute onset of the disease, the rate will be extremely increased. During convalescence the rate shows a gradual decrease. However, if the case is being followed closely with sedimentation rates, any complication such as pleurisy, empyema, or pericarditis will show a sudden sharp increase in the rate.

Rheumatic fever is another disease closely associated with sedimentation rates.*** During the acute clinical phase of the disease the sedimentation rate is high. Taken regularly, the rate gives a definite prognostic indication as to the course of the disease. With regression of the disease as noted by improvement in joint symptoms and temperature, there is a definite decrease in the rate, where with further complications, such as increased joint involvement or cardiac complications, the sedimentation reading persisted or increased.

The abdominal manifestations of acute rheumatic fever present a challenge to value of the sedimentation rates. One paper*** quotes a number of cases with apparent clinical diagnosis of acute appendicitis were operated on only to find normal appendices, and subsequently developed multiple joint symptoms. Lesser and Goldberg** feel that the sedimentation rate can be a very satisfactory aid to this problem. All forty cases of rheu-

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* G. S. Todd; Intnat'l Med. Digest; 49:3 Sept. 1946.
** Lesser & Goldberg; Surg., Gyn. & Obst. 60:2, Feb. 1935.
*** Plimpton Guptill, Ann. Surg. 1934.

matic fever they studied showed a sedimentation rate reading from a high to a severe reaction, whereas appendicitis cases show a normal reading. Therefore, they feel that the diagnosis of the abdominal manifestations of rheumatic fever was properly differentiated from acute appendicitis with the aid of the sedimentation rate.

It is an established fact that the sedimentation rate is gradually increased in pregnancy beginning with the second month. But the rate again shows its value in abortions and ectopic pregnancies. In incomplete abortions with retention of secundines and onset of sepsis there is a sharp rise in sedimentation. Also, with a ruptured ectopic pregnancy with hemorrhage into the peritoneal cavity, the reading is greatly increased.

In cases of salpingitis, Lesser** found that a sedimentation rate of less than 20 mm. (Westergren) was an absolute assurance of absence of acute pelvic infection. All the typical cases of acute salpingitis showed increased readings, depending on the degree and extent of the pelvic pathology. Sedimentation readings taken at regular intervals determined the progress of the disease and the optimum time for operation, in cases where history and examination indicated. They observed that long after the temperature, white count, pain and tenderness had subsided, the delicate sedimentation reaction became a more accurate indicator as to time of operation. In all cases that were not operated upon until the sedimentation rate was below 25 mm (W), no acute processes were encountered and convalescence was good.

At Mayo Clinic* they have found that the sedimentation rate is of value in recognizing diarrheas due to organic diseases. If the rate is low, there is little chance that organic disease will be found, but if it is elevated they are sure there is something seriously wrong with the bowel, such as stenosing enteritis, beginning ulcerative colitis, a tuberculous or cancerous lesion, or a bacillary dysentery. They have had cases where history caused them to suspect a nervous cause for diarrhea, but a high sedimentation rate suggested organic disorder and further study revealed a previously missed lesion.

The sedimentation rate is also helpful in estimating extent or seriousness of colitis of the thrombo-ulcerative variety. If only the rectum and sigmoid are involved, the rate stays normal. The test does help in determining the extent of tissue destruction.

The value of the sedimentation rate is most evident in the diseases hereto mentioned. But all my reading, studying, and actual experience leads me to this conclusion: that one of the most important (and perhaps least used) applications of the

* Alvarez & Borgen; Proceedings of Mayo 19:10, May, 17, 1944.

sedimentation rate today is in the diagnosis of the acute surgical abdomen. How often we are called to do a stat white blood count for a possible appendectomy, but how seldom is this order accompanied by a stat sedimentation rate. However, in the cases we have studied where both were ordered our conclusions parallel other surveys. That is: despite a definitely high leukocyte count, in which definite acute appendiceal pathology is demonstrated after surgery, the sedimentation is normal. Pathologic states such as catarrhal, suppurative, and gangrenous appendicitis show a normal reading. Our study revealed 77 cases having rates under 12mm. (C). The only cases giving abnormal readings were those of abcesses, or peritonitis of appendiceal origin. All other conditions producing an acute surgical abdomen showed definitely increasing readings.

TABLE I

WHITE BLOOD COUNT	No. of Cases	SEDIMENTATION RATE IN MM. (CUTLER METHOD)																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+
6,000- 9,000	15	1		2	1	1			2	1	4	1			1	1		1			
10,000-13,000	33	1	3	2			2	4	3	3	4	1	1				3	1	2	1	2
14,000-16,000	22	1	1	2	2		3		1	1	4	1		2	1				1	1	1
17,000-19,000	14			1	2		1		1	2	2	2	1								2
20,000-23,000	9			3			2	1		1			1							1	
24,000-30,000	6		1							1		1	1	1							1
Over 30,000	1	1																			

Abdominal conditions other than acute appendicitis that produce acute surgical abdomens are:

Acute salpingitis, as heretofore mentioned, all such cases give a high sedimentation reaction. Ordinary clinical and laboratory measures have often made it very difficult to differentiate between acute adnexal disease and acute appendicitis. It is most evident now that the sedimentaion rate is indeed an aid to this diagnosis, for the adnexal disease will constantly give a high rate, while acute appendicitis will constantly give a normal reaction.

Acute surgical gall bladder—this, too, will give a moderate to high sedimentation reading.

Acute conditions of genital-urinary tract—these conditions, such as pylonephrosis, pyelitis, urethral calculus and seminal vesiculitis have occasionally suggested acute appendicitis, but the sedimentations on such cases have been consistantly high.

Tuberculous peritonitis has at times given abdominal manifestations, but here, too, the sedimentation is high.

Masked chest conditions with abdominal manifestations. This group with referred abdominal pain also has to be differentiated from appendicitis. But such cases, with high sedimentation rates, have subsequently proven to have acute pulmonary pathology. Such as the case of the 5 year old boy on whom I did a white count and differential one night. The count was 18,300 and the differential showed a definite shift to the left of polynuclear cells. He was prepared for an appendectomy, but after some consideration was observed until morning, when an X-ray of the chest revealed pneumonia. Had a sedimentation rate been ordered the night before with the blood count, acute appendicitis could have been earlier ruled out.

Other conditions such as ruptured ovarian cyst, ruptured ectopic pregnancy, mesentery thrombosis have on occasion entered into differential diagnosis, but have all revealed an elevated sedimentation rate.

Such case histories as this reveal the value of the sedimentation rate:

A 12 year old boy admitted for acute appendicitis. Onset of illness was 4 days previous with pain in epigastreal region, followed by nausea. Pain then shifted to lower right quadrant. The temperature was 101°, pulse 120, white count, 12,200 with 85% pmns. Sedimentation rate was 94 mm (W). Because of the sedimentation reading not being cosistant with acute apppendicitis, the case was observed further. In 2 days the abdominal pain subsided and patient complained of pain in right hip. In several hours this was followed by acute painful swelling of right knee, and a diagnosis of rheumatic fever was evident.

The theory of the sedimentation rate has been greatly discussed, but the basic principle is the rapidity at which the erythrocytes fall in a given column, regardless of which method is used. In this series, the Cutler method was used. Of these 100 cases, 77 were found to have normal sedimentation rates under 12 mm. Of the 14 cases in which the rate was from 17-22mm, it was found that 6 cases were acute appendicitis with obstructive factor or proximal obstructive factor. The highest reading of 22 mm was an acute appendicitis with gangrene and obstructive factor. Two other readings of 18 and 21 mm were on acute appendicitis with fecalith and acute appendicitis with chronic periappendicitis. Table I demonstrates the relation of the leukocyte counts to the sedimentation rates.

In our study of 100 cases of acute appendicitis the sedimentation rates by Cutler method proved to be correct in not more than 77%. Having this in mind it would be essential to not depend entirely on sedimentation rates, but to use other laboratory reports and clinical symptoms. This is true in every other clini-

cal sign, symptom, or laboratory determination in cases of acute appendicitis.

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A COMMUNITY BLOOD CENTER*

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There are many blood banks located in major cities throughout the United States. Of these, a few are independent, but most of them are sponsored by various groups.

A common type of blood bank is one which operates in conjunction with a hospital. The Samuel Deutsch Serum Center is a part of Michael Reese Hospital, and one of the large distributors of blood grouping and Rh typing serums. Hyland Laboratories in Los Angeles is an example of a commercial laboratory founded by a private physician, which deals in blood serums, plasma and various other by-products of blood. Although most banks are guided to a great extent by their local medical societies, the Irwin Memorial Blood Bank is directly sponsored by the San Francisco County Medical Society. With the need for blood increasing, the legislatures of some states have financed state-wide programs for collecting and processing blood. Massachusetts, Michigan and North Dakota are the pioneers of this movement. Private endowment is responsible for the establishment of a few of the large banks although this financial arrangement is not as common as it might be.

The Belle Bonfils Bank of Denver is of this type. The Chamber of Commerce of Hawaii may be credited with the Blood Bank of Hawaii located in Honolulu. It has an enviable record of service to the community. Part of this service included the aid which was given by the blood bank during the Pearl Harbor disaster. In the near future the Chamber of Commerce of Minneapolis plans to establish a War Memorial Blood Bank in that city. The Red Cross has recently come forth with a plan to operate blood centers in cities throughout the United States where this type of service is not adequate. In Milwaukee the Junior League, upon advice from the Medical Society of Milwaukee County, sponsors a blood center which is unique in many respects.

It was established and opened in September of 1947 by a seemingly social group to fill the need for efficient blood service to the community. The finances necessary for such a project were raised by means of a theatrical production and through voluntary contributors. The project is so arranged that it may be classed as a non-profit organization and thus be of the greatest

* Read before A.S.M.T. Convention, June 1948.

benefit to the community. Lastly, the blood bank is constantly served by members of the Junior League who donate their services. They are under the supervision of the Medical Director and the medically trained personnel.

Donor Recruiting

One of the major problems of any blood bank is a constant supply of donors. To a great extent replacement donors should maintain that supply. To insure replacement donors, a plan is usually necessary. The penalty system is used by the Junior League Blood Center of Milwaukee. By means of this arrangement donors help to credit the account of the patient who has already received a transfusion. The charge for blood is thirty-five dollars a pint. When a donor replaces the blood, a twenty-five dollar credit is issued to the patient. A ten-dollar service fee is paid by each patient who does not belong to the donor club. If the patient is indigent, two donors may entirely replace the donor and service fee. Replacement donors are sought after and encouraged. The hospital staff cooperates to inform the patient and those concerned of the need. Cards bearing all the necessary information regarding donors and appointments are placed in the patient's room following a transfusion. That the bank would rather have the blood replaced than the money for it, is evident in the slogan "The blood bank cannot put money into the patient's veins."

Other ways to recruit donors are through religious and fraternal organizations, clubs, public spirited donations, and industrial donor clubs. These groups donate the blood first on a two-for-one basis and may use their credit for a year from the date of donation. Also they do not have to pay the ten dollar service fee usually charged for the blood.

Each blood bank may obtain its donors differently, depending upon the area in which it is located. The Milwaukee Blood Center is fortunate in being able to draw from the large industries located in Milwaukee County. This is done by organizing industrial donor clubs which donate in groups and thus maintain an adequate "capital" to operate the bank. The plan appeals to industry too because it saves time. They need not send a carload of employees to a hospital laboratory to have their blood grouped and Rh factor determined in order to find a suitable donor for another employee.

In spite of all these groups of volunteer donors, a professional donor bureau is operated by the blood bank. These professional donors are called to supplement the bank when any particular blood group is needed.

Publicity

Closely related to donor recruiting is the publicity for a blood bank. During the war the Red Cross had a tremendous public appeal for blood bank support. That appeal no longer exists but its effects on the public remain. They are aware of the increasing need for blood and its by-products in present day medicine, so publicity concerned with a blood center is well received. Also people are used to giving blood now and the idea is no longer frightening to them. Since the Junior League Blood Center of Milwaukee is a bank which supplies the county of Milwaukee, the publicity has local appeal too.

The best known methods of advertising help in promoting a blood bank. The Blood Center uses posters displayed in industries, public buildings and on streetcars; pamphlets placed in employees' pay envelopes; ads and articles in the newspapers and magazines of industry and the local press; and radio programs devoted to explaining the bank's operation.

Processing of a Donor

After donors are procured, they must be efficiently handled at the Blood Center. When a donor arrives at his appointed time, he is asked to sign the daily donor register. This register contains the names of all those people who wished to give blood. If they are later rejected through some test, it is noted on the register opposite their name.

The donor is then interviewed and a master card is filled out for each new donor (see Fig. 1). A careful history is taken according to the list on the reverse side of the card (see Fig. 2). Particular emphasis is put upon malaria and infectious hepatitis. At the Junior League Blood Center in Milwaukee no donor is accepted who has ever had malaria. If the donor has been in a malarious area, he must have returned two years before and have stopped atabrine suppressive treatment at least one year ago. Persons who have had infectious hepatitis or have been in contact with it within the past two years are rejected.

If nothing to disqualify the donor is found during the interview, the next step is the so-called technical interview. Here the donor's hemoglobin is checked by the Copper Sulphate hemoglobin method and the blood grouping is done on the master card using capillary blood taken from the ear. The prospective donor's blood pressure, temperature, pulse and weight are then checked and if they meet the requirements he is an acceptable donor. He then signs and dates the master card and legally releases his blood.

How the Blood Is Drawn

In the donor room the procedure used to cleanse the donor's arm is to swab the area in which the phlebotomy is to be done with tincture of green soap, a mixture of 20% acetone in 70% alcohol by volume, which eliminates traces of the soap, then apply tincture of Iodine, and finally cover the site of venipuncture with 2 x 2 squares of gauze soaked in 70% alcohol saturated with sodium thiosulphate (3%). Wipe the surrounding area with another gauze square.

The local anesthetic used is 1% procaine hydrochloride (without adrenalin).

The blood is drawn into a chilled, inverted, commercial flask containing 120 c.c. of an acid-citrate-dextrose solution prepared according to the National Institute of Health standards. The set used for drawing the blood consists of a seventeen gauge 2" needle, approximately 24" of 3/16" by 3/32" rubber tubing, a fifteen gauge 2" needle (which is inserted in the rubber bottle top), two plain 13 x 100 m.m. tubes, which are used to cover the needles and later serve as pilot tubes, and a detachable shut-off clamp which is tightened before the needle is pushed through the rubber stopper.

When the flash is full, the needle is withdrawn from the bottle and the blood is allowed to flow into 3 tubes—1 oxalated and 2 plain. The bottle is agitated for one minute after filling. One clotted tube accompanies the bottle of blood (in a muslin bag which is attached to the bottle) when it is sent to the hospitals. The other tubes are sent to the laboratory where the Kline, test-tube method of Rh, and the known cell method of blood grouping are done on the second clotted tube. The known serum method of blood grouping and the slide Rh test are done on the blood in the oxalated tube.

All of the tubes and the bottle are given a whole blood number. A gummed label bearing perforated numbers for labeling the tubes is used on the bottle. (See Fig. 3). Another tag of cardboard is tied to the bottle and when the lab work is complete, it is filled out and used in the active blood bank file for selling the blood. (See Fig. 4).

The donor's arm is bandaged with a pressure bandage of elastoplast tape and he then signs the donor receipt book. There are four copies of each receipt—one for the donor, the hospital, the blood bank, and for the donor club if the donor belongs to one. (See Fig. 5).

Refreshments are then served to the donor in the canteen, and there the personal contact with the donor ends. However, after the laboratory tests are complete, each donor receives a card

LAB. NO.	DATE	BY	WHERE TAKEN	HISTORY CHANGES OR REMARKS SUGGESTIVE DIS.	PAST DISEASES	TEMP.	PULSE	BLOOD PRESS.	KLINE	BLOOD GROUP	RH	DONOR'S WEIGHT AT TIME	CHECK NO.
2481	3/15/48	JR	GC						Neg	AB	POS+	166	

RESULT OF BLEEDING (SUCCESSFUL, UNSUCCESSFUL, PARTIAL, REASON, NO.)

DONOR'S REACTION—NONE, MILD (DIZZINESS, NAUSEA), MODERATE (DIZZINESS, NAUSEA, VOMITING), SEVERE (FAINTING, CONVULSIONS)

LAB. NO.	CREDIT TO: PATIENT OR FUND	HOSPITAL	A	B
2481	Mrs. Jos R. Dookes	County Hosp.		

ANTI-B

Fig. 1

500 cc. CITRATED

WHOLE BLOOD (HUMAN)

Preserved with 75 cc. of ACD Solution
Serologically Negative by the Kline Test

GROUP AB Rh POS+

WB 2481 3-15-48
Registration date

CAUTIONS

This blood is compatible for one only if it has been stored continuously at 4° to 10° C. (39.2° to 50° F.) and provided the appearance of the plasma and cells after mixing are within normal limits. Do NOT warm. Hot water bags or electric pads should NOT be applied to blood container or tubing. Do NOT add other medication to blood.

Prepared By
Junior League Blood Center of Milwaukee, Inc.
A Non-Profit Organization
925 W. Wells Street Milwaukee 3, Wis.

NOTE TO TECHNICIAN: Make certain that the number on the bottle label is the same as shown on the other tube and the tag attached to the neck of the flask.

This blood MUST be cross-matched with the patient's blood before transfusion. It MUST be passed through a suitable G19 filter (150 Mh mesh to the inch) to remove any clotted fibrinogen.

DIRECTIONS

1. Shake vigorously for at least one minute before using.
2. Remove outer diaphragm and closure stopper with antiseptic.
3. Insert sterile 15 gauge needle not over ½ inch into the larger indentation to relieve the vacuum. Remove needle and insert into small indentation pressing into glass air tube. Leave needle in this position.
4. Shake carrier shut-off clamp on tubing is closed. Insert filter drip adapter into larger indentation.
5. Invert container. Open shut-off clamp and allow blood to displace air in tubing before attaching needle to adapter.
6. Proceed with transfusion. Give first 10.0 cc. slowly (not over 4.0 cc. per minute). Make all adjustments of rate of flow with clamp near needle. Trained attendant must be present during entire duration of transfusion to watch for possible untoward reactions.

Fig. 3

Nº 2481	Nº 2481	Nº 2481	Nº 2481

WB 2481 Name Dookes, Joseph R
Drawn by J.R. Date 3-1-48
History Check by DR G Jaundice No Malaria No
Kline Negative By N.D.
Cell Grouping AB By N.D. Serum Grouping AB By G.F.
Finger Grouping OK.
1st Rh Pos By N.D. 2nd Rh — By —
Grouping 2nd Rh Checked By J.R.
Agglutinin Titre —
Release Date By
To
Order No.
WB 2481 Group AB Rh POS Typed Date 3-15-48

Fig. 4

Date 3-1-48 Signature Joseph R. Dookes
Date Signature
Date Signature
Date Signature
Date Signature

BASIC DONOR REQUIREMENTS: Age 21-60. Blood Pressure 100-180 systolic and not over 110 diastolic. Blood Specific Gravity above 1052. Weight over 110 lbs. for Females. 125 lbs. for Males.
I certify that this donor appears to be free of diseases transmissible by blood transfusion on the date which is also the day of removing the blood from said donor.

Date 3-1-48 J.D. Greenwald M.D.
Date
Date
Date
Date
Date

Fig. 2

DOOKES, JOSEPH R.
Blood Group AB
Rh POS+
Medical Dept. No. Henry J. Gruenwald M.D.
MEDICAL ADVISORY BOARD MEDICAL DIRECTOR

Fig. 6

CONFIRMATION COPY
JUNIOR LEAGUE BLOOD CENTER OF MILWAUKEE, INC.

DONOR'S COPY
JUNIOR LEAGUE BLOOD CENTER OF MILWAUKEE, INC.

HOSPITAL COPY
JUNIOR LEAGUE BLOOD CENTER OF MILWAUKEE, INC.

BLOOD BANK COPY
JUNIOR LEAGUE BLOOD CENTER OF MILWAUKEE, INC.
A NON-PROFIT ORGANIZATION
925 W. WELLS ST.—MILWAUKEE 3
PHONE: BROADWAY 7200

No. 2682

DONOR'S RECEIPT

HOSPITAL COUNTY HOSPITAL

FUND

DONOR'S NAME DOOKES, JOSEPH R. DATE 3-1-48 TIME 4:00 P.M.

PATIENT'S NAME MRS JOS R. DOOKES BLOOD TYPING DATE

BY J.R.
JUNIOR LEAGUE BLOOD CENTER

BY Jos. R. Dookes
DONOR'S SIGNATURE

IF MULTIPLE DONATIONS ARE MADE BY RELATIVES AND FRIENDS AND NOT USED, SAID BLOOD WILL BE CREDITED TO PATIENT'S ACCOUNT FOR 60 DAYS. AFTER THAT TIME THE CREDIT MAY BE USED BY THE HOSPITAL TO ASSIST THOSE PATIENTS LESS FORTUNATE AND IN NEED OF ASSISTANCE.

Fig. 5

bearing the donor's blood group and Rh type, the date of donation and for whom the blood was given. (See Fig. 6).

Laboratory Methods

The blood itself is tested in the laboratory by two different medical technologists and the results are checked against each other and the grouping on the master card before the blood is marked. The Rh slide test is done with human anti-Rh testing serum (85%) and only if the results are negative is it checked with a second slide test using 87% anti-Rh serum. When both of these serums give negative results, the tube Rh is done by another medical technologist using 87% anti-Rh serum. Thus the Rh negative bloods are doubly checked. All of the blood found to be group 0 is divided into high and low titer by determining the titer of agglutinins in the serum. Thus low titer group 0 blood may be selected for universal use. An expiration date of 14 days is put on each bottle of blood, although with the preservative used, the blood may be kept a maximum of 21 days. Before the blood is sent out, it is capped and sealed with plastic bands called Celons.

The Blood Center will take back blood which is in good condition for use as plasma after it has reached the 14-day expiration period. Another product which may be obtained through the Blood Center is resuspended red blood cells. Also, the Junior League Blood Center houses the Milwaukee Serum Center, one of six serum centers in the United States, licensed by the U. S. Public Health Service.

Preparation of Equipment

Any blood bank is as good as the equipment it uses for pyrogenic reactions begin in the preparation room in many cases. All of the equipment used is cleaned and sterilized, with the exception of the blood bottles, at the Junior League Blood Center. A major rule is that all sets, following use, must be disassembled and immersed in cold tap water and cleaned immediately. New and used rubber tubing is boiled in 5% sodium bicarbonate solution for twenty minutes, then rinsed thoroughly with tap water under pressure and with pyrogen-free distilled water until neutral to litmus paper. All fully assembled sets are flushed with at least 50 c.c of pyrogen-free normal saline and a Diack sterilizing indicator is included in each two-set package. Sets must be assembled and autoclaved within four hours of the completion of the cleaning of the equipment in the sets. NO SHORT CUTS ARE PERMISSIBLE.

Customers

The Junior League Blood Center of Milwaukee is one of the few blood banks in the country that actually stocks the hospitals with various blood groups. When the Blood Center was organized, contracts were offered to all of the hospitals in the county approved by the Medical Society. All of these hospitals may order a stock of blood and report the name and address of the patient as it is used. This enables the hospitals to maintain a prompt transfusion service at all times. As yet none of the cross matching is done by the Blood Center although in time it may be done in the case of patients who are not hospitalized.

Personnel

The personnel of the Blood Center has gradually increased from the time when a full-time medical director was hired to organize the center until at present when nurses are responsible for the bleeding, medical technologists do all phases of the laboratory work, well-trained persons prepare the equipment, a medical secretary handles the correspondence, and a business manager and her assistants manage the office.

In addition to these persons the Blood Center is fortunate in having 182 members of the Junior League who volunteer their services in every department. They work in the canteen, office, preparation room, donor room, deliver the blood to hospitals, serve on numerous committees which recruit donors through publicity, organize donor clubs and act as a hospital liaison committee. They play a vital part in the efficient operation of the center.

Advantages of A Community Blood Bank

1. The major advantage of a central community blood bank is that it makes possible the rapid service of blood and its products to the community.
2. Rare blood groups may be distributed more efficiently.
3. There is a standardization of laboratory methods and preparation of equipment to eliminate reactions.
4. There is a supply of blood, plasma and serum on hand in case of disaster.
5. A community blood bank has an additional advantage in that all hospitals, medical men, and the community will support a project for the good of all concerned.

The Future of A Community Blood Center

1. Research on blood and its by-products for the benefit of all.
2. Production of Rh typing and blood grouping serum.
3. Fractionation of proteins.
4. Training of medical personnel through a teaching program and rotating internships.

THE RESPONSIBILITIES OF THE MEDICAL TECHNOLOGIST

LALL G. MONTGOMERY, M. D.,
Chairman Registry of Medical Technologists of the American Society of Clinical Pathologists

It is a great day when the student technician completes her training, passes her Registry examination and receives her certificate which tells the world that she is now a fully qualified medical technologist. The responsibilities of the student are over No more examinations. No more term papers. No more nightly stints with a pile of textbooks. But there are new and even weightier responsibilities which must be borne if the newly certified medical technologist is to take the rightful place which her accomplishments have won her.

We all know those in any walk of life who shun all responsibility. If a medical technologist is that sort of person she may say "My only responsibility is to make the tests that are requested. That is what I was trained to do, and that is what I am employed to do. What more do you want?" This is true in a literal way, but it must be obvious to most medical technologists that this literal interpretation of the responsibilities of a medical technologist is very narrow, and that there is much more to be said than that.

Naturally the *first* responsibility of any professional person is to carry out the functions of the work of that profession, and that applies to the medical technologist as to all others. We all know those duties very well, for they are the things that go into the making up of the complicated and exacting life which we all live who work in modern medical laboratories. The business of making tests is just a small part—an end result—of the detailed system of getting requisitions, sorting out the work among the staff, getting the materials for testing, setting up the tests, making the examinations and reporting the results. The actual making of the tests obviously requires constant care of reagents and apparatus, and when the tests are completed, the results must be reported in a clear and understandable way and the records must be made and maintained in such a way that they are constantly accessible. And all this must be done with a background of scientific accuracy and intellectual honesty which is a fundamental responsibility of any professional person.

Another part of the life of a laboratory worker is the constant need to keep up with new developments in the field, take technical journals, read new textbooks, learn new tests and after checking them carefully against tried and trusted methods, make

these new developments available to the physicians and their patients.

Again, since the medical technologist is a professional person, her duties often call upon her to work long hours and to do many things that are not actually required of her by the usual terms of employment. In this way she takes her place beside physicians and others who keep the medical care of the American people on such a high level of excellence.

These are all parts of the job and are always accepted by medical technologists without any question. But there are other and less commonly recognized responsibilities which must be accepted if the profession of medical technology is to take its full rightful place in the organization of modern society. These responsibilities are of a more general but no less important kind, and have to do with the responsibility of the medical technologist to her profession as a group. Just as no chain is stronger than its weakest link, no link, no matter how strong, is of much use if it is not securely welded into the structure of the total chain.

A medical technologist working in her laboratory may do a fine job of the day-by-day work, and read, and practice new tests, and work nights and holidays, and do all things that make her a dependable technician, but she still may not be doing her full duty if she does not take an active part in the organization of her profession. When this is mentioned we sometimes hear the reply, "But I *do* belong to the Registry." It is unfortunate but true that there are many who still think that the Registry is a *Society*. In fact, no one can BELONG to the Registry because it is only what its name implies, and that is a Registry or list of those who have passed the Registry examination and who are practicing medical technology in an ethical way. The professional Society of Registered Medical Technologists is, as everyone should know, the American Society of Medical Technologists, and it is one of the first duties of the newly registered medical technologist to join this, her professional society, and to take an active part in it.

Unfortunately it is often difficult for a laboratory worker to take time off for national meetings, or even local meetings, but whenever it is possible it is an unavoidable duty.

But, even when it is impossible to attend meetings there are still many things that the medical technologist must do to fulfill her professional responsibilities, and not the least of these is the need for interesting others in the field of medical technology.

If there are not enough medical technologists to carry out the work of Medical Technology as a profession, it is obvious that there can be no profession of medical technology, and the places

that should rightfully be filled by qualified laboratory workers will be filled, as they are all too often filled these days, by unqualified and poorly trained workers. These cannot take their place in a profession that they are not trained to enter, and unfortunately they often shed discredit upon qualified workers and the profession of medical technology because many do not distinguish between qualified and unqualified workers.

All through the war pathologists and medical technologists struggled heroically to maintain an adequate supply of qualified laboratory workers not only for the laboratories of the armed forces, but also for the laboratories on the home front. But now that the war is over it is just as important to maintain the supply. This is not only a duty to the sick who need our services, but it is a duty to ourselves and our profession. The need to take an active part in recruitment of enough medical technologists to fill the needs of our country is a major responsibility of every qualified laboratory worker which must be accepted if she is to take her place in her profession.

Naturally, much of the necessary organization work of supplying medical technologists is carried on by the approved schools of medical technologists. But in spite of a school system which involves the entire system of medical teaching organizations, hospitals, and universities and colleges, there is much that they cannot do without the help of the individual medical technologist, and much of their work can be done so much better with the help of the individual medical technologist. Actually it is the individual who is practicing any profession who is most likely to interest another in that profession. It is well known that those who go into the study of medicine are influenced more in their decision by having known someone who was a physician than by what they have read about it or for any other reason. Therefore, although the Registry sends out thousands of publicity pamphlets a year, and although the American Medical Association publishes and distributes a list of approved schools of medical technology, and although the American Society of Medical Technologists through its national, state, and regional societies does everything it can do to publicize the profession of medical technology, it is really the individual technologist who finally does most of the really effective recruitment of young student material. And so it is really the individual medical technologist who finally and fundamentally is responsible for the maintenance of the supply of new medical technologists which will keep the profession in the forefront of medical organizations.

There are many ways in which the medical technologist may carry on this necessary work of recruitment. The most intimate, and almost certainly the most effective way is to show indi-

viduals or groups the work actually going on in a laboratory. But sometimes opportunity presents itself to reach larger groups, such as school classes or clubs. Career day conferences are wonderful opportunities to spread the work, and the radio and newspapers are always looking for material that has a wide public appeal. The Central Ohio Society of Medical Technologists recently interested a reporter from the Columbus Dispatch in writing an excellent article about the field of medical technology. This article is being reprinted for use in recruitment.

Pathologists are always glad to assist technologists in their work of publicity, and approved schools of medical technology usually have publicity material which they are glad to provide for such a worthy purpose. Often a hospital day program, or a state or regional medical meeting will be glad to give a place on its program for a talk on medical technology, or a place among its exhibits for a display of up-to-date laboratory tests.

Exhibits and publicity pamphlets, reprints of articles, radio talks of any length, outlines of articles, lantern slides for use with talks at meetings, and ready advice and assistance with any project for the publicizing of medical technology is available from the Registry office. Also, the officers and office staff of the American Society of Medical Technologists will do everything in their power to assist in anything which will forward the good cause.

It is easy to see in even such a brief summary of the responsibilities of the medical technologist that these responsibilities are numerous and heavy. But nothing is worth having that is not worth working for and when we have by hard work and sacrifice, gained the status of a professional member of society with all the advantages which that status gives us, we must then admit and assume these many and grave responsibilities as part of our professional life. Medical Technology is a profession, which in less than twenty years has gained its present honored place among the professions. It has done this by virtue of the hard work and careful organization of its members. Let us not fail to maintain this honored place, and this can only be done if we continue to accept our full responsibility as members of our profession.

TEACHING AIDS: SIMPLIFIED ABSTRACT SYSTEM*

By RACHEL LEHMAN, M.T. (ASCP)
Instructor of Medical Technologists, Indiana University Medical Center
Indianapolis, Indiana

How often do pathologists ask us if we have read or if we have heard of this new technique that appeared in a certain journal? If we have not read that article, we need not always feel ashamed as many technologists do not have the time to read or many pathologists cannot set aside a certain time for them to do it within the working day. However, we should build good reading habits with our students and teach them to do abstracts. Many students will accept positions where the doctor will insist that a file of abstracts be kept or will expect the technologist to do the abstracting.

How are we to accomplish the task? Each laboratory should have in its departments journals that deal with the respective department. Also many journals that deal with the general techniques should be purchased. Many of the students that train in a hospital accessible to a medical school will be able to use the library of the school.

Last September we decided that our students should get the reading habit instilled in their student days; so we decided that we would list a group of journals that the students should become familiar with and require them to abstract the articles dealing with techniques. Since we had twelve students, we selected twelve journals. The journals were rotated each month, thus making each student familiar with each journal. Since they trained twelve months and most journals are published about every two months, the students were given a chance in abstrating the same journal twice.

(List of journals abstracted will be placed on lantern slide.)

Our next problem was to find a method of writing abstracts that would be valuable. With the help of the chief librarian at Eli Lilly and Company we decided upon this form. This gives the method of listing the subject, author, volume, page, and publication date. This form also allows space for a filing subject and a cross index.

We asked the students to read Chemical Abstracts and Biological Abstracts to give them an idea of what was necessary in writing or summarizing the material. We limited the abstracts to a minimum of fifty words and to not more than seventy-five with detailed procedures. Short procedures often contained not more than twenty-five words. Abstracts should be written in

* Contribution to Panel ASTM Convention, St. Paul, Minn., June 7, 1948.

such a fashion that they will stimulate reading; we did not allow the students to copy the mere summary.

In order that the abstracts would be of value to others, we cross-indexed each abstract at least two or more times. For instance, the subject of *Bone Decalcification* could be filed under *Bone* as well as *Decalcification*.

We purchased ditto paper that had previously been perforated in order that cards could be made of each abstract. In this manner enough abstracts can be made for each to have one, as well as each department. The abstract, even if poor, would bear the subject and cross file. A master cross file could be kept in the pathologists's office. This method helps in keeping a reading file and an author file.

In summary, we hope to accomplish the following things:

1. Familiarize each student with a journal that she can use.
2. Acquaint students with authors by the type of work they do. It is a great deal of satisfaction to know that certain procedures have been tried.
3. Stimulate technologists to read more.
4. Teach all technologists the use of the library and the Quarterly Cumulative Index Medicus.

VISUAL AIDS USED IN TEACHING*

By RACHEL LEHMAN

Today in the field of medicine we can use the camera in making demonstrations such as lantern slides and movie films. Many times we would be unable to demonstrate an actual condition if films or slides were not made; and if visual aids are employed, it is far more effective.

In fact, visual education is so important that a committee was appointed January 3, 1947, for audio-visual aids to be used in medical education. This committee functions with the War Department, Navy Department, Veterans Administration, and Public Health Service. This committee incorporates all fields of medical education. Yes, I mention that this service is available to medical schools. True, but what is keeping the schools that teach medical technology from trying to find films or from making films? For instance, in anatomy there could be films on histology and the type of stains employed showing what certain stains should demonstrate when completed. In biochemistry, the technics of colorimetry, Van Slyke manometric and volumetric methods could be demonstrated. Charts carefully prepared can be used to advantage and will permit the instructor

* See previous footnote.

to amplify his lecture. In this way minute details are not left out. Again, colorimetric determinations can be prepared, such as CO poisoning, as often students would never see this test.

In the field of bacteriology, the technics of stains, smears, sero-diagnostic tests, can be easily shown on film strip or motion picture. Time-lapse photography can be used in bacteriology to an excellent advantage.

Many subjects such as balancing a centrifuge or holding a pipette can often be most effectively taught by the visual aid.

Parasitology is another field where visual aids are effectual, particularly in showing life-cycles of parasites. I think we are all convinced of that importance when we see the films that can be rented from the Atlanta Public Health School. Many of us saw the film on the life-cycle of the Schistosome as shown us by Dr. Miller of the Public Health School at the 1946 meeting in San Francisco.

In our school we have used the illustration department to a good advantage when such cases as Tick Fever make their appearance and we are able to use the kodachrome films of the patients, and finish the film series by showing agglutination tests and the geographic distribution of this disease in our state.

In this closing paragraph, I wish to emphasize that these films are not to supplement actual laboratory material but to aid the instructor in teaching. For instance, in my manual on the preparation of subject material, I prepare my slides or films as I would my test tubes or waterbaths as an essential in teaching. We can remember much more of what we can see than what we hear in the ordinary lecture. We can use this method in hematology to a good advantage by making kodachrome slides from our loan sets so that the actual slide is projected in lecture or in the laboratory. I have found this to be an easier and more effective method of teaching.

Again I wish to stress that we as an organization trying to prepare good Medical Technologists should build up a film catalogue. Those interested in photography as a hobby could prove it is a most needed hobby; and these films or slides can be used to advantage.

"HIRING A NEW MEDICAL TECHNOLOGIST JUST OUT OF TRAINING SCHOOL"

RUTH CHURCH, MT (ASCP), *Wilmington, Del.*

What is your mental picture of the *new* medical technologist? Is she not high spirited, neat, alert, possessing a keen mind open to suggestion, and very aware of the high principles of her profession? Am I not right in so describing her? A new tool—a highly specialized tool. With a polished surface, a keen cutting edge. A tool that will with proper care continue to give excellent service.

Upon the entrance of the *new* medical technologist into your laboratory the responsibility of the proper care rests not on one, but on many people. Her fellow medical technologists thru example and comradeship will do much to uphold her high standards and her enthusiasm. Her pathologist through wise direction and suggestions will stimulate her to keep on striving. The institution for which she is working, with proper pride in its laboratory and its reputation will further encourage her as well as the entire staff! The cooperation of these three groups will result in greater service in her new chosen profession.

A primary need is the chance to keep abreast of the recent advances in the various fields of our profession. This *new* medical technologist needs ready reference to current professional magazines, the open door to professional libraries, and the necessary time to pursue these magazines and for library study. The pathologist and the institution will see that the periodicals are at hand. Your pathologist can procure access to the local medical library. Through careful planning of her work, and cooperation of her fellow workers the necessary time can be found.

Our *new* medical technologist is further encouraged by efficient working facilities and conditions. Suggestions from her should be warmly welcomed and acted upon—not just tabled for future reference.

Further care of the *new* medical technologist calls for association with other medical technologists. Each laboratory needs its own periodical staff meeting. Then we need local meetings in each community open to all laboratory workers. Meetings that have well planned programs—both educational and recreational. There should be a wealth of material on hand in some central spot that is available for these programs. Friendly exchange of letters and ideas between different localities, invitations to meetings of other groups, and finally national conventions must be offered to the *new* medical technologist. By these

means the *new* worker is continually reminded of our purposes and principles as upheld by our registry. This is a big aid in eliminating some irritating small habits that the new professional worker is prone to acquire. Such as "clock watching," forgetting that the "welfare" of the patient comes first, or carelessness in some details of her records.

"Common sense" remuneration is an added spur and incentive to the *new* medical technologist. A graded plan of salaries is needed. A beginner should know that if she becomes more skillful and if her work is up to expectations she can expect a steady regular raise in salary. There are many problems here needing careful attention. Should she as a student be earning a salary? Then how much more is she worth after training?

There is a real need for a chance for further education on and above the technical school, or the college course. Why not a master's degree in medical technology? Refresher seminars and month long courses in a specialized field are all that is now offered to this *new* medical technologist. A further incentive should be in the offing. Namely that she not only has the satisfaction of mastering new knowledge to aid herself in her work, and so aid the institution for which she is working but also she herself is gaining actual academic credits towards a real goal—that of her master's degree. Extension courses and night schools should become a reality. What better means is there to keep this new tool really efficiently working?

With the hiring of the new medical technologist just out of training school we assume many responsibilities. Some of these have been listed with suggestions as to how best meet these responsibilities. Further suggestion or discussion is now welcomed.

Questions for Discussion

1. What magazines or periodicals should be in your laboratory?
2. Should the student be paid a salary?
3. Could a master's degree in medical technology be gotten?
4. Does civil service recognize degrees in rating of medical technologists?

A MEDICAL TECHNOLOGIST—INDUSTRY

MRS. EILEEN SMITH, MT (ASCP)
General Mills, Inc., Minneapolis, Minn.

The same qualities of body, mind, and soul required of a medical technologist in the laboratories of a doctor's office, hospital, and clinic are desirable in the industrial laboratory as well.

A strong body, good health, keen mind with good cultural as well as specialized educational background—a pleasant, cheerful disposition and an ability to get along with people—a neat, clean appearance, a deft, sure manner, and a quiet efficient, persistent habit of never leaving a task unfinished are necessary in industry, too.

A buoyancy and winsomeness that comes from physical and mental health, a poise and dignity that comes with good grooming; initiative, assurance, and intelligent aggressiveness and reliance on intellectual integrity, together with humility of spirit make a combination hard to achieve, but impossible to resist. In short, scrupulous accuracy and endless patience are required of technicians everywhere, (as Rose Hackman reports in an article in "our" Journal of March, 1947). And as stated in "Chemist of the Week" by Grady, Chitteson, etc., "It is delightfully refreshing to find in industrial work a position of so much interest and importance for which women, properly trained, are not only well suited, but better suited than men."

Many of the same analyses are performed in our laboratory in the same manner as in the medical laboratory. Instead of Todd and Sanford as the bible, we use the AACC—*American Association of Cereal Chemists*'—laboratory manual and the AOAC—*American Oil Association of Chemists*' Manual, and our own *General Mills, Inc. Products Control* Manual.

I will cite a few examples of tests, with which many of you are familiar, as they are run off in our laboratory: Calcium, phosphorus, iron, chlorides, pH, moisture, ash, free fatty acid (% as oleic), fat, carotene, thiamine, riboflavin, acid numbers and neutral equivalents, acetyl numbers and hydroxyl numbers, iodine values, saponification values, peroxide numbers and the Swift test for rancidity.

The analytical laboratory in the Research Building of General Mills Incorporated provides a place for the research chemists and physicists to have quantities of routine or special tests done, quicker and less expensively than having each specialist do his own. These include calls from all sections of the Research Department, Nutrition and Foods, Organic, Protein, Fats and Oils. Physics and Packaging, new products departments, and also the

pilot plants, and their varying specialty of the moment—ready mixes, polyamide resins, allyl starches and the like. Many specialties of the pilot plant have since gone into production and are now found on the market as breakfast cereals: Wheaties, Kix, Cheerios, and as Ready-Mixes: Bisquick, Pyequick, pea soup, vegetable noodle soup, gingercake mix and the like.

And therein lies a tale of pleasure—for my chief indoor sport is eating. I arrived at General Mills Research Laboratory in April, 1943, as I remember at the end of the angel-food cake era. McClelland was a baker, and our sole experimental kitchen, too. These angel-food cakes were wonderful! Then I remember the "soupy session"—pea soup, vegetable noodle, bean soup; I prefer the sweets. Next came the ginger bread era. There followed other cakes, then soup and more soup—with us always like "death and taxes." I remember doing storage tests, for product stability and package effectiveness—made endurable because the pie era was still with us. You don't mind doing peroxide numbers weeks on end with a piece of apple pie sent down around three o'clock or cake later to take home.

I asked one of our older men with the laboratory (not in years of age, for ninety employees have been with the company five years or more and the department is only eighteen years old) why the Research Building was located where it was. The company was founded by Minneapolis men back when St. Anthony Falls was the Twin Cities.

"Because equidistant from the downtown office, the University of Minnesota, and the Farm Campus, and because the land was available," he answered. This convenience is still reflected in the fact that many employees take classes while working full or part time. Other reasons I learned were as follows: 1. It is somewhat isolated from our manufacturing plants, which means fewer interruptions; 2. It is near trackage; 3. As a non-productive building enterprise, it could be placed on less expensive ground; 4. The smells and wastes connected with research might now prevent the company from finding other quarters.

Our Safety Committee made up of representatives from each division—semi-plant, the machine shop, the chemical and physics division, the polyamide plant, the office, etc.—is a live and active agent. The natural hazards of fire, explosion, acid burns, building hazards, slippery floors, gongs, and signs, all get attention, and quickly, when a need is shown by the Committee directly or via the suggestion box. Some repairs or additions are pretty costly, as for example $1.25 for a sign—but $10.00 for the person making the suggestion. The company still considers it cheap at twice the price; for the policy of peace and content and good fellowship, known as "imagineering," really serves a purpose.

The company in this connection also sponsors the Girls' Club and the Men's Club within which are divisions having bowling and golf tournaments, dinners, get-togethers, tickets for special events like the Aqua Follies and the Ice Follies at a reduced rate, and the annual baseball game.

Getting back to the department in which I work, we consist of a Section Leader and nine fulltime workers—two men and eight girls—of all ages—of which eight workers have degrees in chemistry, chemical engineering and bacteriology, and two have about three years of college plus practical experience in laboratory technique.

Now back to the analyses we do—there is a definite need to test for calcium, phosphorus, iron, and other minerals in enriched products like flour and cereals to maintain quality. In case of moisture it is done for maintenance of quality and for the preservation of the product during storage (the legal limit for moisture is 38 per cent in flour), and so that this moisture in any given locality can be calculated.

As for the tests in the strictly organic field of chemistry, free fatty acid is calculated as "% oleic." Fat determination is run to indicate the per cent present in the product and also to extract the fat for its peroxide value indicating rancidity.

Vitamin assays indicate maintenance of quality and moral integrity of the company. In nature they vary, yet the medical profession and nutritionists agree that it is better to obtain an adequate supply from our food than from the drug store and much more economical.

The accuracy of methods, suitability for the product tested, and the standard of laboratory and individual workers is maintained through collaborative testing weekly. There are twenty-six laboratories, mostly mills, which take part in the testing of the moisture, ash, and protein content of flours; eight also test for thiamine. Our tests are run in duplicate routinely, where quantity of the sample is available. Most tests require 1-10 grams per request—macro rather than micro methods, as in the hospital laboratories. All of the data that accumulates is returned promptly to the party sending in the request. "Terry" likes the report the day before he sends it in if possible. Others are willing to wait while we do it, but they don't wait long enough for us to fill out our laboratory report sheet.

One of our problems is modifying standard techniques and procedures to fit new or different products. I now run peroxide numbers on most anything, even dog food!

Most of the researchers' projects are published in professional journals and lead to discoveries of new products and methods of production or to the improvement of old ones.

In the words of James F. Bell, retiring chairman of the Board of Directors of General Mills, Inc., in his "Paths of Tomorrow":

"We must follow where research leads . . . This is an age of research. Out of laboratory test-tubes are born daily new marvels to serve mankind. Thousands of researchers are looking into the unknown—into fields that have no other limits than men's imagination. But research is not confined to the laboratories. Research has its origin in the individual. All of us are research workers, no matter what our jobs or services. We must surpass whatever has already been accomplished. To keep ahead, each of us, no matter what our task, must search for new and better methods. For even that which we now do well must be done better tomorrow. This spirit lives in the words of Kipling:

'And they asked me how I did it, and I gave 'em the
Scripture text,
"You keep your light so shining a little in front
o' the next."
They copied all they could follow, but they couldn't
copy my mind,
And I left 'em sweating and stealing a year and
a half behind'."

ABSTRACTS

URINALYSIS

ERYTHROCYTES IN URINARY SEDIMENT: IDENTIFICATION AND NORMAL LIMITS. With a Note on the Nature of Granular Casts by Rodney C. Larcom, Jr., M. D., and George H. Carter, Boston, Mass. (From the Medical Department of the John Hancock Mutual Life Insurance Company.)

These authors state "that aware of the confusing variations in size, shape, and optical density of erythrocytes in the urinary sediment and of the responsibility of even an experienced technician for correct identification," they have modified a tissue stain which appears specific for erythrocytes.

Stock solutions required are:

1.0% aqueous solution of benzidine hydrochloride (Merck)
2.0% aqueous solution of sodium nitroprusside
30.0% solution hydrogen peroxide (superoxal).

The benzidine and nitroprusside solutions keep from four to five months in brown bottles, if not exposed to direct sunlight.

Working solutions:

A. 0.1% benzidine in 0.2% nitroprusside.

1 cc of the stock 1.0% aqueous solution is diluted with 6-7 cc distilled water.

1 cc of the stock 2.0% solution of sodium nitroprusside is added and the final volume made up to 10 cc with distilled water.

This solution is stable for about 2 weeks; if a precipitate forms the solution should be discarded and a fresh solution prepared.

B. 3.0% hydrogen peroxide.

1 cc of superoxal is made up to 10 cc with distilled water.

This solution deteriorates in three to four days.

(Ed. Note: Hydrogen peroxide acts upon organic material, therefore the distilled water used in this technique should be double distilled, preferably from permanganate.)

Technique

A drop of sediment is placed on a slide and a drop of the diluted benzidine-sodium nitroprusside solution added. Mix by tilting the slide or stirring with a cover glass. Add a drop of the dilute peroxide solution, mix carefully.

Special treatment of alkaline urines:

The sediment of alkaline urines do not stain rapidly. The authors suggest that 1-2 drops of 10% nitric acid be added to the sediment in the tip of a centrifuge tube. This acid does not cause hemolysis in the hands of the authors who believe that urine has a fixing property. Also the crystals which are present are alkaline.

Wash the urine sediment three times with 0.9 saline solution.

After washing, the sediments give results comparable to those obtained from acid urines.

Urine specimens of high specific gravity, especially those to which preservatives have been added usually react slowly to the stain. Allow the stain to react five to eight minutes before examining. Washing these sediments 3 times with 0.9% saline accelerates staining.

Results

Erythrocytes are stained a deep purple. If the cell has deteriorated the color may be a pale or even light blue. Yeast cells in urines less than 24 hours old may show a slight blue-green iridescence which is not confused with the deeper purple color and the less refractive appearance of the stained erythrocytes. Older yeast cells show no affinity for the stain. Leukocytes show pale-gray of the cytoplasm with slightly dark and irregular staining of the nucleus; no granules were observed in the cytoplasm of either leukocytes or epithelial cells. Hyaline casts do not take the stain. Granules of fine and coarse granules show the same deep purplish or bluish purple hue of the stained erythrocytes. Red blood cells in casts stain similarly to those found free.

Formaldehyde or the preservative tablet used by insurance companies are recommended as the choice preservatives.

Normal limits:

It is stated that a normal individual may excrete as many as 600,000 red blood cells in a twelve hour period. The authors report that this number of erythrocytes suspended in a 300 cc sample of urine (the average 12 hour output) with 15 cc centrifuged at 2000 rpm for five minutes would show about 2 erythrocytes per high dry field.

The staining technique does not give figures quite this high. As a measure for avoiding dilution of the sample, the reagents may be added to the sediment, carefully mixing and then recentrifuging. The authors base this report on findings from 3000 urinalyses.

CONCENTRATION TEST OF RENAL FUNCTION USING POSTERIOR PITUITARY INJECTION. By Norman G. Schneeberg, M. D., Department of Endrocine Research, Michael Reese Hospital, Chicago. Arch. Int. Med. 80:193 (August) 1947.

The inability of the kidney to concentrate urine is among the first signs of renal disease.

In clinical practice the test described is performed as follows:

1. The patient empties the bladder completely. If the sp. gr. is above 1.021 the test is not necessary.

2. A ten unit dose of posterior pituitary injection U.S.P. is given subcutaneously.

3. Urine is collected at one and two hours. If the amount is insufficient for a sp. gr., collect a third specimen at the end of 3 hours.

4. Normal patients will show a sp. gr. of 1.022 or higher.

The author states that the test is simple to perform and avoids sources of error inherent in tests requiring periods of abstinence from fluid.

Contraindications for posterior pituitary injection are:

1. Hypersensitivity to this drug.
2. Pregnancy.
3. Severe coronary arterial disease.
4. Angina pectoris.
5. Epilepsy.

HEMATOLOGY

A STUDY OF SICKLING OF YOUNG ERYTHROCYTES IN SICKLE CELL ANEMIA. By Janet Watson, M. D., Department of Medicine, Long Island College of Medicine, Brooklyn, New York. Blood 3:465 (April) 1948.

A quantitative study of the sickling of reticulocytes was undertaken using the sealed preparation, gas chamber method, and the gas test tube methods. Data obtained from this study showed that reticulocytes from patients with sickle cell anemia, or having the sickle cell trait, sickled as readily as the more mature red blood cells. The most immature reticulocytes and normoblasts sickle more slowly—, and orthochromatic normablasts were the only cells which did not sickle.

THE EFFECT OF OPERATION AND ILLNESS ON CLOT RETRACTION: Description of a New Method. By John S. Hirschboeck, M. D., Milwaukee, Wisconsin. Jour. Lab. and Clin. Med. 33,347 (March) 1948.

By employing a new capillary coagulation retraction test, it is shown that the retraction time is shortened in many bedridden patients and patients during the postoperative periods. This information foretells the need for prophylactic treatment with anticoagulants against phlebothrombosis and pulmonary embolism.

The method employed is as follows:

From a 3 mm, puncture, withdraw 20 c. mm. of blood by using a Sahli hemoglobinometer pipette. Record the time when skin is punctured. Expel the drop upon the surface of a test tube filled with castor oil (U.S.P.). This procedure should be completed within 20 seconds and done in duplicate. The tests should check within three minutes. Set the stoppered tubes in a rack at room temperature and observe at the end of 10, 15 and 20 minute

periods. The end point is a "visible dimpling of the clot surface with extrusion of a tiny droplet of serum."

Normal clot retraction is 20 minutes or longer with an average of 33.1 minutes. Clot retraction varies within normal limits during course of day, following physical activity and with menstruation.

This method is reliable for control of heparin therapy but not during Dicumarol therapy.

Mary Francis James, M.T., (ASCP),
Medical College of Alabama.

HISTOLOGY

CLEARING BRAIN TISSUE WITH ANETHOLE. By Joan Haberman, Department of Anatomy, University of Wisconsin, Madison, Wis. Stain Tech. 23:143, (July) 1948.

Brain tissue is composed of lipids and protein, each having a different refractive index. The framework of the brain is protein, and before brain tissue can have a relatively uniform refractive index, the lipids must be removed. The solubilities of the brain lipids are very important to successful clearing of brain tissue. The phospholipids are insoluble in acetone. Lecithin is soluble in both ether and alcohol. Cephalin is soluble in ether, insoluble in alcohol. Sphingomyelin is insoluble in ether, soluble in hot alcohol. Cerebrosides are soluble in hot alcohol, insoluble in ether and alcohol.

The technique given is as follows:

Start dehydration of formalin fixed brain tissues in the alcohol series beginning with 35%. Keep tissues in 100% alcohol at 60° C. for one or two days. Then place in ether for 2 days. Place tissue in anethole, contained in an open vessel, allow to remain until clear.

The refractive index of brain tissue dehydrated in alcohol and extracted with ether is 1.560. Anethole, $(C_{10}H_{12}O)$EKC, is an oil having a refractive index of 1.5614. This substance is colorless, very slightly soluble in water, soluble in alcohol and ether, and liquid at ordinary temperatures.

SEROLOGY

THE THYMOL TURBIDITY TEST IN VARIOUS DISEASES. By Hyman B. Stillerman, Medical Department, Grady Hospital, and the Department of Medicine, Emory University School of Medicine, Atlanta, Ga. Jour. Lab. and Clin. Med. 33:565, (May) 1948.

Because the thymol turbidity test has many advantages over other tests for liver function in current use, such as the stability of reagents, a quantitative method of determination, the short interval of time needed for its performance, and apparent sensitivity, prompted the author to evaluate this procedure by testing

sera from patients with liver disease as well as various other diseases.

Thymol turbidity tests were run on the following groups of diseases: Infectious hepatitis, Cirrhosis of the liver, Obstructive jaundice, Diseases of the gall bladder, Diseases with widespread liver destruction, Therapeutic malaria, Acute lymphogranuloma venereum, Rheumatoid arthritis, Acute rheumatic fever, Heart disease with and without failure, Chronic lung disease, Acute infectious diseases, and Neoplastic diseases. 567 persons were tested; the technic used was the Shank and Hoagland (Jour. Bio. Chem. 162:133, (1946).

The results obtained indicate that the thymol turbidity test should not be regarded as a specific test of liver function. It apparently depends upon abnormal protein patterns which may or may not reflect liver disease. The turbidity is due to the formation of a complex consisting of a globulin, phospholipid, cholesterol, and thymol.

This test is of greatest value in following the progress of cases of infectious hepatitis. Negative thymol turbidity and cephalin flocculation tests help in the differential diagnosis between obstructive jaundice and hepatogenous jaundice.

CHEMISTRY

A SIMPLE BEDSIDE METHOD FOR THE ESTIMATION OF BLOOD SUGAR. By Rachel S. Leech and Norma Woodford. From the George F. Baker Clinic, Elliott P. Joslin, M. D., Medical Director, New England Deaconess Hospital, Boston, Mass. Jour. Lab. and Clin. Med.; 644 (May) 1948.

The method is based on the reduction of dinitrosalicylic acid by glucose. A set of prepared color standards are used. Reagents required are:

(A) 10 per cent zinc sulphate ($ZnSO_4$. 7 H_2O)

(B) 0.5 N sodium hydroxide. (A stock solution preferably is kept in a paraffined bottle.)

(C) These solutions, A and B, are the regularly employed macro-solutions for preparing a Somogyi filtrate and may be kept in small bottles provided with dropping pipettes graduated to deliver 0.4 ml of the solution.

(C) Dinitrosalicylic acid solution prepared as follows:

(1) A sodium potassium phenol stock solution is made by dissolving 400 Gm. of Rochelle salts (sodium potassium tartrate) in about 600 ml of warm distilled water to which 13 Gm of phenol crystals are added. When the Rochelle salts and phenol are dissolved, the solution is mixed well and diluted to 1,000 ml.

(2) 12 Gm of monosodium 3.5 dinitrosalicylate (Eastman Kodak) are dissolved in 700 ml of distilled water

heated to a temperature of 65° C. When dissolved, the entire volume is poured into the liter of sodium-potassium phenol stock solution and mixed well. A yellow precipitate forms.

(3) 6 gm of sodium bisulphite ($NaHSO_3$) are added to solution #2 and the whole is thoroughly mixed.

(4) Finally, 300 ml of 10% sodium hydroxide (2.5 N) are added, and the final solution completely mixed. The yellow precipitate which formed in step 2 disappears at this point. Place the solution in a brown bottle and allow to stand about a week before using.

To test the solution, titrate 5 ml with normal acetic acid to the appearance of a white precipitate. If the reagent has been correctly prepared, 1.86 ml of acetic acid should be required for 5 ml of the reagent. This solution remains stable for four to five months if kept in the dark in a brown bottle. Filter the solution if any cloudiness develops.

Apparatus required:

(A) Tube 1. A test tube approximately 12.5 cm and 15 mm in diameter graduated at 3.8 ml.

(B) Tube 2. A pyrex test tube approximately 15 cm long and 15 mm in diameter, graduated at 2.0 and 4.0 ml.

(C) A cup or beaker in which a small amount of water may be boiled.

(D) A small funnel fitted with a piece of folded filter paper. (Whatman No. 1, 5.5 or 7.0 cm in diameter.)

(E) A micro-blood pipette graduated at 0.1 and 0.2 ml.

(F) A prepared series of color standards or a prepared color chart.

Procedure:

Measure into tube #1, 0.4 ml each of Reagents A and B, using the calibrated droppers with which the bottles are equipped, then add distilled water to the 3.8 ml mark. Rotate the tube gently, introduce exactly 0.2 ml of blood taken directly from the ear or finger by means of a micro blood pipette. (If venous blood is used it should be collected in a mixture of fluoride-oxalate prepared by mixing together 50 gm powdered sodium fluoride and 20 gm powdered potassium oxalate. Seventy milligrams of this mixture are used for each 5 ml of blood.) Mix the contents of the tube with the pipette by alternately sucking up and blowing out the blood mixture; then filter immediately into tube #2 using a small funnel and filter paper. The filtrate should be water clear. Allow filtrate to collect to exactly the 2.0 ml mark; add reagent C to the 4 ml mark, mix by rotation and place in boiling water bath for exactly three minutes. The color changes during the heating period from a pure yellow, a deeper yellow,

yellow brown, or reddish brown depending upon the concentration of glucose. Cool slightly and compare against standards.

Preparation of Standards:

An accurate stock glucose solution prepared in saturated benzoic acid containing 0.2 Gm glucose per 100 ml is required. A dilute standard containing 10 ml of this stock solution diluted to 100 ml is used in preparing the standards.

A series of tubes using quantities of the dilute glucose standard in amounts from 0.5 ml to 3.0 ml is prepared. Freshly boiled distilled water which has been cooled is added in amounts to make a total volume of 4 ml. Then to each tube exactly 4 ml of Reagent C are added; the contents of the tubes are mixed and the tubes placed in boiling water for exactly three minutes. After cooling 4 ml of the colored solutions are transferred to clean, dry tubes of the same diameter as tube #2. Two drops of toluol are added to each tube, then the tubes are stoppered and sealed with paraffin and labeled according to the amount of glucose present, im mg per 100 mg.

Chart for Preparation of Glucose Standards

Dilute Glucose Standard (ml)	Boiled Water (ml)	Blood Sugar Equivalent (mg per 100 ml)
0.5	3.5	50
1.0	3.0	100
1.5	2.5	150
2.0	2.0	200
2.5	1.5	250
3.0	1.0	300

The authors found a close agreement with their rapid method and the Folin-Wu, Folin-Malmros, Hagedorn-Halstrom-Jensen (micro). The authors state that this method in its present form is not suitable for the estimation of low blood sugars.

A SIMPLE QUANTITATIVE CHEMICAL METHOD FOR ESTIMATING γ GLOBULIN IN HUMAN SERUM. By B. V. Jager and Margaret Nickerson, Department of Medicine, University of Utah School of Medicine, Salt Lake City. Jour. Bio. Chem. 173:683 (April) 1948.

The authors state that in both normal and pathological sera, the quantity of protein present in this fraction was found to correlate well with values estimated electrophoretically for γ globulin in the same samples with the method outlined by them.

Method

Reagents:

1. Saturated ammonium sulphate brought to pH 7.0 with ammonium hydroxide.

2. 0.33 saturated ammonium sulphate (pH7.0).
3. Dilute biuret reagent Weichelbaum. Amer. Jour. Clin. Path. Tech. Sect., 16,40, (1946).

Technique

To 1.0 ml of fresh serum in a 12 ml centrifuge tube, 0.5 ml of saturated ammonium sulphate is added drop by drop, the precipitate being shaken *thoroughly* after the addition of each 0.1 ml. The precipitate generally will disappear after shaking until more than 0.3 ml of salt solution is added. The suspension is placed at 4° C. overnight. It is then centrifuged 30 minutes at 3000 rpm in an angle centrifuge. The pale yellow, clear supernatant fluid is removed by aspiration and discarded. The packed precipitate is finely emulsified in the tube with a stirring rod after addition of 3.0 ml of 33.3% saturated ammonium sulphate. The tube is recentrifuged for 30 minutes at 3000 rpm and the clear, colorless supernatant is removed. The precipitate is dissolved by shaking in 10 ml of 0.85% sodium chloride. To 5 ml of this slightly opalescent colorless fluid 5.0 ml of the biuret reagent are added. The protein content is measured in a Coleman model 11 universal spectrophotometer, with 7 mm cuvettes with a wave-length setting of 555 mu. When a serum has a high liquid content, the precipitate redissolved in saline may appear turbid after the biuret reagent has been added.

Experimental observations were made upon the accuracy of the method, protein-bound phosphorus content, antibody content and electrophoretic composition of fractions.

The authors feels that the method permits sufficient recovery of gamma globulin to detect relatively slight quantitative changes in the ranges in which this constituent is normal or relatively elevated as well as in the range in which it is greatly increased.

BACTERIOLOGY

A COMPARISON OF TWENTY-FOUR HOUR AND FORTY-EIGHT HOUR READINGS OF ROUTINE GONOCOCCUS CULTURES. By Adelaide M. Mueller, A. B., and E. Ellen Neel, A. B., U. S. Public Health Service and the John University Venereal Disease Research and Post-Graduate Training Center, Baltimore, Md. Amer. Jour. Syph. Gonorr. and Ven. Dis. 32, 139 (March), 1948.

Specimens were collected as follows: Exudates were obtained on sterile swabs, which were placed in 3 ml of a semi-solid medium made with Difco dextrose-starch agar. (13 gm in 1 L water adjusted to pH 7.4.)

Urine specimens were collected in sterile centrifuge tubes, centrifuged, and the sediment plated. Specimens were plated almost immediately after collection. Two plates were inoculated on routine Difco media with Supplement A.

The authors found 48 hour incubation superior to 24 hour incubation when routine Difco media was used.

THE LABORATORY DIAGNOSIS OF TUBERCULOSIS—A PROFESSIONAL SPECIALTY. By Seward E. Miller, M. D., Chief, Laboratory Division USPHS Communicable Disease Center, Atlanta, Georgia. Page 81, June issue, 1948, Current Medical Digest. (Williams and Wilkins publication.)

So excellent is this article that the abstractor deems it wise to quote a number of passages:

"The laboratory diagnosis of tuberculosis is one of the most important services that the laboratory is called upon to render. A mis-diagnosis is invariably disastrous.

"—the search for acid-fast bacilli in a smear is not enough for a definite answer. The problem is much more complex.

"Too frequently in the average laboratory the individual who is assigned the task of searching for the tubercle bacilli is inadequately trained.—Actually, intelligent, thorough tuberculosis bacteriology, for accurate results, depends on good work by well-trained and capable personnel using all the varied techniques available.

"—Microscopy so far seems to be somewhat inferior to culture and animal inoculation. If there are less than 100,000 bacilli per cu mm they are likely to be missed on smears only and this is often the case in patients with only mild or early tuberculosis disease. Also, there are many non-pathogenic acid-fast and alcohol-fast organisms which are practically identical with the tubercle bacillus in microscopic appearance. The culture technique is more sensitive and reliable than direct microscopic examination and is more rapid and less expensive than animal inoculation.

In the hands of the author Jensen's and Holm's modification of Lowenstein's medium has given a greater number of positives in a short time. It is easily prepared.

	Percent	1 Flask	4 Flasks
Salt Solution:			
Monopotassium phosphate	0.4	2.4 g	9.6 g
Magnesium sulphate	0.04	0.24 g	0.96 g
Magnesium citrate	0.1	0.6 g	2.4 g
Asparagin	0.6	3.6 g	14.4 g
Glycerine (twice distilled)	2	12 cc	48 cc
Redistilled water		600 cc	2400 cc
Potato flour	5	30 g	120 g
Eggs		1 L = 1⅜ K	4 L = 5½ K
Malachite-green 2% solution		30 cc	80 cc

Important points in preparing this medium are:

"The salt solution is heated in a pot until all is dissolved; place 612 cc into each flask, and heat in a steam-bath for 2 hours. Next day 30 g of potato flour are added to each flask.

The flasks are boiled with continual shaking in a water-bath, until the contents are clear, then boiled for 15 minutes more after which they are left standing in the water-bath for 1 hour at 56° C.

"Only fresh eggs are used. The hens laying these eggs should be fed on greens.

"The eggs are washed in a 5 per cent soda and soap solution for 30 minutes. They then are placed in running cold water until this water is perfectly clear. They are broken into a sterile flask, shaken well and filtered through sterile gauze.

"Two liters of eggs are mixed with two flasks of salt solution and to this is added 40 cc of malachite-green. The mixture is left standing for one hour before tubing into pyrex test-tubes, in a layer 5½ cm in height. The medium is inspissated or solidified in slanting tubes at 85°-88° C. for 40 minutes. The cotton stoppers are trimmed and paraffined.

"It is very important that the preparation of the culture medium follow closely the given directions, as even small changes may jeopardize the result. It is advisable to keep the culture medium at 5°-10° C. temperature, not exposed to drying or sunshine. —Fresh medium is important and we never keep it over two weeks.

"—the main points to be observed in using this cultural technic are as follows:

1. Use fresh eggs from well cared for hens. Green feed is best.
2. Use clean, sterile technique.
3. Proper inspissation—40 minutes at 85°-88° C.
4. Proper storage of tubes.
5. Use hard glass tubes.
6. Use freshly prepared media—not over two weeks old.

"The morphology of the different strains of Tubercle Bacilli on Modified Lowenstein's Medium is as follows:

1. Human—colonies are eugonic, rough, firm, friable, and cream colored.
2. Bovine—colonies are dysgonic, smooth and shiny, conical and gray-white in color.
3. Avian—colonies are less eugonic than human but not dysgonic like bovine, smooth hemispherical in shape and have a yellowish color.
4. Saprophytes—colonies are very eugonic, soft and creamy, usually smooth but may be rough and are usually pigmented but may be cream colored. Usually they appear in just a few days.

Dr. Miller points out that Dubos medium is better for transferred cultures than for primary isolations due to the fact that this medium is very easily contaminated.

There are three other excellent points brought out in this article: First, every fungus isolated from a tuberculosis patient should be identified as a measure to determine whether or not it may or may not be the primary etiological agent causing a patient's illness. Second, Dr. Miller states: "Since we realize that the services of trained mycologists are not available to many laboratories, we are happy to function as a reference diagnosis laboratory for those who desire such mycological diagnostic services." Third, consultation services are available, upon request, to those laboratories experiencing technical difficulties.

The Communicable Disease Center Tuberculosis Evaluation Laboratory, (Atlanta, Ga.) offers a five weeks course for technicians consisting of lectures, demonstrations and practical laboratory work.

Ed. Note. In a personal communication to the abstract editor, Dr. Miller stated that the eminent bacteriologist, Dr. Martin Frobisher is now with the USPHS in Atlanta, Ga., as a member of their staff.

MISCELLANEOUS

JAUNDICE AND HEPATITIS: A Laboratory Review. By S. M. Rabson, St. Joseph's Hospital, Fort Wayne, Indiana. Amer. Jour. Dig. Dis. 15; 7, (Jan) 1948.

In this article a brief review of liver changes in jaundice and hepatitis and the respective laboratory findings are given. The following table for normals is quoted:

Normal Values of Liver Function Tests

Test	Author		
	Hangar	Sherlock	Watson & Hoffbauer
Bilirubin, total (T)	0.5-1 mg	1 mg	.....
Bilirubin, delayed reacting	0.8-1.0 mg	.....	.....
Bilirubin, prompt	0-0.19 mg	.....	0.2 mg
Bromsulphalein	0-10%	.....	0-5%
Cephalin-Cholesterol flocculation	0-+	.....	.....
Cholesterol	160-240 mg	120-130 mg	200 mg
Cholesterol ester fraction	65-75 mg	.....	125 mg
Copraporphyrin	.....	.....	100 gamma
Galactose clearance test	75 min	30-90 min	.....
Hippuric acid Synthesis	0.7 g	0.75-1.2 g	0.7 g
Protein, total	.....	6-8 g	.....
Albumin, blood	4-5.6 g	3.4-5 g	4.8 g
Globulin, blood	1.5-2.6 g	1.5-3 g	2.5 g
Prothrombin time	.....	12-18 sec	12 sec
Serum Alkaline phosphatase	2-4 units	5-10 units	4 units
Thymol turbidity	0-4 units	.....	4 units
Urobilinogen in urine	1 unit	.....	1 unit (3 mg)

AMONG THE NEW BOOKS

CLINICAL DIAGNOSIS BY LABORATORY METHODS: A Working Manual of Clinical Pathology. By James Campbell Todd, Ph.B., M. D., Late Professor of Clinical Pathology, University of Colorado School of Medicine; Arthur Hawley Sanford, A.M., M. D., Professor of Clinical Pathology, Mayo Foundation, University of Minnesota; Senior Consultant, Division of Clinical Laboratories, The Mayo Clinic; with the Collaboration of George Giles Stilwel, A.B., M. D., Division of Laboratories, The Mayo Clinic. Eleventh Edition. 954 pages, with 397 figures. Philadelphia and London: W. B. Saunders Company, 1948. Price $7.50.

The sequence of the material in this new edition follows the general plan of the previous editions. Much new material has been added, and the entire text rewritten. New colored plates have been added which are definitely an asset to the book. Also many new photographs and illustrations have been included. The book is up to date and contains many new technics and some material not found in other laboratory texts. The methods outlined for serodiagnostic tests for syphilis are those of author serologists, as published by the United States Public Health Service. Excellent bibliographies are given at the ends of the various chapters.

The reviewer feels that this is another edition which is a *must* for the modern up-to-date clinical laboratory and medical technologist. This book should be in the library and on the reference shelf in all schools of medical technology.

THE ACUTE BACTERIAL DISEASES: Their Diagnosis and Treatment. By Harry F. Dowling, M. D., F.A.C.P., Clinical Professor of Medicine, George Washington University; Chief, George Washington University Medical Division, Gallinger Municipal Hospital. With the collaboration of Lewis K. Sweet, M. D., Chief Medical Officer in Pediatrics and Infectious Diseases, Gallinger Municipal Hospital; Adjunct Clinical Professor of Pediatrics, George Washington and Georgetown Universities; and Harold L. Hirsch, M. D., Assistant Professor of Medicine, Georgetown University;Director of Bacteriology and Immunology Laboratory, Georgetown University Hospital. 465 pages with 55 figures. Philadelphia and London: W. B. Saunders Company, 1948. Price $6.50.

This new volume is a medical classic. The subject matter is direct to the point, and the clever illustrative diagrammatic charts used throughout the book place this book in a distinct category in usefulness. The book is written for physicians; in no sense of the word is it a laboratory manual, but a medical technologist should check her knowledge of various diagnostic tests used in making a differential diagnosis through a perusal of this book. The purpose of the book is to combine the new order of diagnosis and treatment with that which is worth while in the old. Throughout one is conscious that not only do the authors have a remarkable background in their knowledge of medical literature, but also, their clinical experience is broad

and varied. Adequate reference material is given at the end of each chapter.

After evaluating each chapter, the reviewer regrets that there is not a companion volume written expressly for medical technicians by these same authors.

AMERICAN MEDICAL DICTIONARY. A Complete Dictionary of the Terms Used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Nursing, Veterinary Science, Biology, Medical Biography, Etc., with the Pronunciation, Derivations, and Definition. By W. A. Newman Dorland, A.M., M. D., F.A.C.S., Lt.-Col. MRC, U. S. Army, Member of the Committee on Nomenclature and Classification of Diseases of the American Medical Association; Editor of American Pocket Medical Dictionary; with the collaboration of E. C. L. Miller, M. D., Medical College of Virginia. Twenty-first edition. 1660 pages, 880 illustrations, including 233 portraits. Philadelphia and London: W. B. Saunders Company, 1948. Price $8.00 plain, $8.50 thumb indexed.

This dictionary has many helps in it. Of particular interest to technologists is the comprehensive list under methods, stains, and tests. The highlights of each method, stain, and test listed is given. Also, no person in the technical field should be without access to a dictionary of this type. The facility of quick reference is important.

Every school of medical technology should have an up-to-date medical dictionary accessible to students. The reviewer wishes to stress the importance of having a good dictionary close at hand for ready reference.

WE ARE NOT ALONE!

or

Tell me if you have heard this one before.

Betty Neu, MT (ASCP), of Springfield, Illinois, gives a resume* of just a few of the problems that confront a group of medical technologists who are attempting to have a "going" organization. Her clever article is written in the form of a conversation among a group of technologists who met for a social hour after a regular business meeting.

1. "Do you think a small mimeographed paper would arouse interest?"

"Even a small paper means a lot of work."

"Well, we might try it. Any budding authors present?"

2. "We voted for meeting at 7:30 P.M., but today we tried 3:30. Now we can see that we were right the first time because the Decatur girls couldn't come this time, and not even all the Springfield girls."

"But the Sisters from Taylorville were here and they can't come in the evening." The Harris County (Houston, Texas) Society holds all its meetings in the classroom of the St. Joseph's Infirmary Nurses' home. This enables the Sisters to attend all the evening meetings. However, this problem would be more difficult to solve if the Sisters who are technologists were not all at the same hospital.

3. "We'll have to arrange transportation." Have you not found that the average technologist who "doesn't have a way to get there" usually manages to find means of getting to another type of meeting—or to a party?

4. "Our treasury is awfully low, too." Try ten dollars a year for dues—that isn't too much for a professional person to pay to belong to his organizations—$5 for A.S.M.T., $2.00 or $3.00 for his state society, and $3 or $2 for his local or district. Registered nurses and doctors pay much more.

5. "Out of 10,000 certified medical technologists, only 3000 belong to the American Society. And we have to have 75 per cent membership before we can get the recognition for which we are working."

6. "We've sent them all membership cards and only two have been returned." Are medical technologists worse than any other group of people about neglecting to answer questionnaires? Or returning "membership" cards?

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* "Over the Coffee Cups," from the *"Merry Micron,"* publication of the Springfield SMT.

7. And how about cliques? There have been accusations made that the "Society is run by a 'clique'." Remember this—those of you who would say that YOU can belong to the clique, too—IF YOU ARE WILLING TO WORK and IF YOU ARE INTERESTED IN MAKING MEDICAL TECHNOLOGY PROGRESS THROUGH YOUR EFFORTS AND IDEAS!

No doubt each organized group of medical technologists has met with these problems and a dozen others. We haven't touched on attendance—nor programs—nor on how often to meet. You are invited to write your solutions of these problems to the editor. Your manner of solving may help a group in some other part of the country—or in your own state.—R. M.

OFFICERS OF STATE SOCIETIES

See July Journal:

ALABAMA: President: Mary Frances James, 812 So. 20th St., Birmingham 5.
Vice-Pres.: Miss Lois E. Van Tassell, 725 Woodward Bldg., Birmingham.
Secretary: Miss Evelyn V. Pow, 1124 So. 20th St., Birmingham.
Treasurer: Miss Erma L. Salter, 708 Tuscaloosa Ave., Birmingham.
Board Members: Mrs. Nellie M. Butler, 2219 Highland Ave., Birmingham; Miss Madie E. Murphy, 2030 Highland Ave., Birmingham; Miss Ruth L. Miller, 119 Bonita Drive, Birmingham.

DISTRICT OF COLUMBIA: President: Mary Ellen Hunter, 1 East Bradley Lane, Chevy Chase, Maryland.
Pres.-elect: Mary Sproul, 2434 Pennsylvania Ave., N.W., Washington 7.
Secretary: Francis Spear, 4621 South Chelsea Lane, Bethesda, Md.
Treasurer: Charles C. Boone, 1363 Bryant St., N.E., Washington 18.

MONTANA: President: Nancy McGarity, 1145 North 30th, Billings.
Vice-President: Sister Marie Pierre (Leonard), St. Vincent's Hospital, Billings.
Sec'y-Treas.: Marie C. Maffei, Allard Clinic, Billings.
Member of the Board of Directors: Sister Pascaline Marie (Oliviero), St. Joseph's Hospital, Lewistown.
Membership Chairman: Sister Marie Pierre, St. Vincent Hospital, Billings.

TENNESSEE: President: Olive Renfroe, 1909 West End, Nashville.
Vice-President: Fannie Mae Dees, 2113 Capers Ave., Nashville 4.
Secretary: Paul N. Byrn, 3437 Woodrow Place, Nashville.
Treasurer: Mabel Harris, Baptist Hospital Lab., Nashville.

NEWS AND ANNOUNCEMENTS
1949 CONVENTION

Virginia's "Magic City," Roanoke, anticipates the prospect of entertaining the American Society of Medical Technologists on June 20, 21, 22, and 23, 1949. Nature has been very kind to Roanoke. The city is situated in a valley formed by the Blue Ridge and Allegheny Mountains, and within the corporate limits, a mountain rises—Mill Mountain—which is detached from the surrounding ranges.

Each one of you who comes to Virginia will want to visit the restored Colonial Williamsburg and nearby Yorktown and Jamestown. So start planning a Virginia vacation for 1949!

Committee Chairmen: General Chairman: Miss Ida Reilly, Roanoke Hospital Association, Roanoke, Virginia.
Program Chairman: Miss Mary Eichman, 440 Lyceum Ave., Philadelphia 28, Penna.
Exhibits (Commercial): Miss Cecelia Korteum, Chicago, Illinois.
Exhibits (Scientific): to be announced.
Registration: to be announced.
Entertainment: Irma Graff, Roanoke, Virginia.
Hospitality: Norma Plunkett, Roanoke, Virginia.
Publicity: Betty West, Roanoke, Virginia.
Sisters' Hospitality and Reservations: Sister M. Rosaria (Brennan), Charlotte, N. C.
Speakers' Supplies: Elizabeth McElrath, Roanoke, Virginia.
Signs: Frances Crouch, Roanoke, Virginia.
Awards: Nell Butler, Birmingham, Alabama.
Local Arrangements Committee: Ida Reilly, Chairman.
Elizabeth McElrath, Frances Crouch.

Start planning NOW to attend!

PROGRAM COMMITTEE

We recognize the fine precedent of past convention programs. We also recognize that such a standard was possible only by the collective effort and cooperation of the membership and the Program Committee. Now we have the obligation to arrange the scientific sessions for the 1949 meeting. Early notice of your contribution for this occasion will be greatly appreciated. Notify us of your plans whether to present a paper and/or any suggestions or recommendations you want considered.

Please write to Miss Mary Eichman, Chairman, 440 Lyceum Ave., Philadelphia 28, Pennsylvania.

NOMINATIONS AND ELECTIONS

Letters have been sent by the Nominations and Elections Committee to the affiliated societies of the A.S.M.T. soliciting suggestions for the slate of officers for the next election. As individual members of the ASMT, the committee would appreciate having your ideas and preferences with the qualifications of prospective candidates, sent to your state secretaries, who will

forward them to this committee. The suggestions may be sent directly to members of the committee.

This is your opportunity to tell us whom you would like to have in the executive positions in the ASMT. Each suggestion will be given careful consideration. Your cooperation is needed NOW. Please send your suggestions by December 1, 1948. Any member of the committee will be glad to receive your communications.

Offices to be filled: President-elect.
Corresponding Secretary.
Board of Directors (two).

Henrietta Lyle Chairman, Maple Manor, RD No. 2, Columbia, Penna.
Gladys Jacobs, 212 Garfield St., Bay City, Mich.
Eunice Reinhardt, St. John's Hospital, Springfield, Illinois.
Clara Kruse, P-33 University Village, 28th & Como Ave., Minneapolis 14, Minn.
Hazel Current, 918 - 17th St., Santa Monica, California.
Frieda Claussen, 469 Laurel Ave., St. Paul, Minn.

REFRESHER COURSES

Federal Security Agency, U. S. Public Health Service, Tuberculosis Control Division and Communicable Disease Center

THE LABORATORY DIAGNOSIS OF TUBERCULOSIS:

1. Two weeks course for Laboratory Directors, senior staff members, and physicians: October 4-15, 1948. Second course: for laboratory personnel: November 15 to December 10, 1948.

2. Training is open to all grades of employed laboratory personnel. First consideration will be given to laboratories of state and local public health departments. Applicants from hospitals and private laboratories will be considered when vacancies occur. Laboratory directors and senior staff members wishing to attend the four-weeks course may do so.

3. There is no tuition or laboratory fee. Travel expenses and living expenses must be paid for by the individual or his employer.

4. Applications for the course should be made as far in advance as possible. Notification of acceptance from this office will be made in sufficient time to allow the students to make arrangements for living accommodations. It is suggested that trainees obtain reservations for living accommodations at the earliest possible date. A list of hotels and rooming houses will be sent to applicants at the time of acceptance.

5. It is desirable that students be tuberculin positive. Tuberculin negative individuals coming for the training will assume all responsibility of possible conversion to tuberculin positivity.

Tentative Outline for the two-weeks course:
1. Laboratory personnel protection.
2. Culture media preparation.
3. Microscopy technique.
4. Interpretation of results and reporting.
5. Culture technique.
6. Digestion and concentration.
7. Culture diagnosis.
8. Animal inoculation and autopsy.
9. Streptomycin assays.
10. Evaluation studies.

Tentative outline for four-weeks course:

1. Preparation of culture media (practice in making the commonly used diagnostic and research media).

2. Microscopic techniques (training in preparation of smears and stains. Interpretation of findings. Fluorescent microscopy).

3. Culture techniques (training in preparation of cultures. Digestion and concentration methods. Particular emphasis on interpretation of findings. Includes training in identification of types of organisms and their colony morphology).

4. Animal experimentation (Training in technique of inoculation and autopsy of mice, guinea pigs and rabbits. Tuberculin testing of animals.)

THE LABORATORY DIAGNOSIS OF PARASITIC DISEASES: Course will be given from October 11 to November 19, 1948. Application may be made to the Laboratory Division, Communicable Disease Center, 291 Peachtree Street, Atlanta, Georgia; Seward E. Miller, Senior Surgeon, Chief of Laboratory Division.

SEMINARS AND CONVENTIONS

Please send two copies of all programs of seminars and conventions of state and district societies of medical technologists to the Executive Office, Medical Center Bldg., Lafayette, Louisiana. These will be used for exhibit display purposes. This office would also like to have copies of your society publications. Copies of the above should also be sent to the editorial office of the journal, 2119 Arbor Ave., together with permission for reprinting in the journal, if space permits.

INFORMATION BOOKLET

Copies of the INFORMATION PAMPHLET (Fourth Edition) will be sent you upon request from the Executive Office.

COMMITTEE MEMBERS

Correction: Standards and Studies Committee: Margaret Miller (instead of Margaret Brown), Pueblo, Colorado.

EXPENSE AND INCOME STATEMENT OF ST. PAUL CONVENTION, 1948

Expense of Exhibits—		
Brede Inc. (750 folders)		$ 141.85
Brede Inc. (booth service and signs)		436.20
St. Paul Hotel		150.00
Porter service		15.00
Cecelia Korteum, expenses		165.00
Cecelia Korteum, stamps and stationery		30.47
Cecelia Korteum, 10% of net exhibit proceeds		81.15
McGowans—set up and operation of microphone equip.		48.00
St. Paul Hotel—powder rooms		20.00
Tribune Printing Plant—tickets, ballots, reg. cards		41.58
Western Badge & Novelty Co.—badges		43.84
R. L. Jones, movie services, show slides, etc.		105.00
Rev. Bishop James J. Byrne (invocation)		10.00
Mrs. Willett—minutes of meeting and secretarial help		50.00
Parliamentarian		15.00
Frieda Claussen—expenses of all local committees		188.76
TOTAL		$1,541.85
Income from exhibits	$1,750.00	
Registration Fees	403.00	
TOTAL RECEIPTS	$2,153.00	

Budget

AMERICAN JOURNAL OF MEDICAL TECHNOLOGY 1948-1949

Estimated Expenditures

Postage for mailing under permit	$ 600.00
Postage for foreign mailing	40.00
"Postage Due" paid for returned JOURNALS	10.00
Mailing help (stuffing, bundling, typing, etc.)	200.00
JOURNAL catalog envelopes for mailing	300.00
Stamps for editor and associate editors	50.00
Office allowance, editor	450.00
Advertising commissions	750.00
Copyright fees	24.00
Printing and motor freight	7,000.00
TOTAL	$9,424.00

Estimated Income

Allowance from ASMT	4,500.00
Subscription sales	700.00
Advertising sales	4,224.00
TOTAL	$9,424.00

OPPORTUNITIES

Chief technician: laboratories of teaching hospital; capable organizer required; staff of three assistants; $3500; university medical center; Middle West. MT9-1

Laboratory technician qualified in x-ray; laboratories of medical department of large American company; should be trained in all routine laboratory procedures including hematology, parasitology, simple bacteriology, blood chemistry desirable but not required; Dutch West Indies. MT9-4

Laboratory technician for office appointment with internist, diplomate of American Board of Internal Medicine; should be well trained in usual office laboratory procedures; winter resort town, Florida. MT9-6

Chief technician; should be well trained in hematology, chemistry, bacteriology parasitology; small private hospital having expansion-program; modern well equipped laboratories; $250 increasing to $350; vicinity New York City. MT9-7

Laboratory technician; department of pathology, new hospital operated by American Company in Arabia; $3600, complete maintenance, transportation. MT9-9

Laboratory technician with administrative ability to join staff of clinic specializing in internal medicine and diagnosis; long established group headed by nationally known internist; should be qualified to carry considerable responsibility. MT9-11

Bacteriologist to direct division; pathologist diplomate of American Board in charge; 200-bed hospital; East; $6000. MT9-14

Technician to join staff of physiological laboratories, large teaching hospital; experience in Van Slyke blood gas analysis, Haldane gas analysis, electrocardiography and other techniques required; eastern university medical center; $3500. MT9-12

Laboratory technician: laboratories operated by group-clinic and hospital; clinic staffed by 27 physicians most of whom are American Board men; hospital modern and well equipped averaging 200 patients; Pacific Northwest; extensive research program; $3500. MT9-13

Biochemist: research program, large institution located in university center; new research building; candidates with advanced degrees and experience required; East. MT9-15

Hematologist and bacteriologist for positions in general laboratories of privately operated hospital; Diplomate of American Board of Pathology in charge; considerable research; college town, Middle West. MT9-16

Technician qualified in x-ray and laboratory work; laboratories of modern well equipped hospital operated under American auspices in Peru; although woman eligible, man preferred; should be under forty. MT9-17

Chief technician qualified to direct blood bank, department of pathology, university medical school; $3600; Middle West. MT9-18

Tissue technician, department of pathology, university medical school; Middle West. MT9-19

City bacteriologist; duties consist of supervising public health laboratories, Chicago area. MT9-20

Chemist; preferably one well trained in biochemistry to direct research department of surgical chemistry; department of surgery, large teaching hospital; Middle West. MT9-22

Two bacteriologists to join staff of eastern university college of medicine; one should be interested in general problem of bacterial metabolism, main portion of research to be concentrated on nucleic acids and nucleoproteins; other should be interested in research involving effect of antibiotic substance on metabolism of microorganisms; $3500-$7000 depending upon experience and qualifications. MT9-25

(In requesting information concerning these appointments, we shall appreciate your mentioning the key numbers.)

M. BURNEICE LARSON

22nd Floor, Palmolive Building — Director, The Medical Bureau — Chicago, Illinois

Woodward Medical Personnel Bureau

[Formerly Aznoes]

Established 1896

CHICAGO

Wanted: Chemist as assistant director of research division in surgical chemistry qualified in biochemistry and able to assist with some teaching for 900 bed fully approved hospital; large central medical center city. $4800 AJT8-1

Laboratory Technician: Qualified in hormone assays and tissues for office of Diplomate of the American Board Obstetrics-Gynecology. Excellent east coast Florida community north of Miami Beach. 4½ days one week; 5½ days the next. $250. AJT8-2

Laboratory-X-Ray Technician: 115 bed Iowa hospital having very complete and modern facilities. $325. AJT8-4

Wanted: Male or female supervisor for chemistry division of large eastern hospital. Prefer PhD but will consider masters in Chemistry. One interested in developing endocrinologic aspects of chemistry; familiar with physiological chemistry desired. New graduate accepted. Academic appointment possible. to $6000. AJT8-5

Bacteriologist: Male, to assist or direct the teaching of bacteriology in eastern medical college and supervise work in a 650 bed hospital $6000. AJT8-6

Laboratory Technician: For excellent Idaho clinic. City 15,000. Modern laboratory. $300. AJT8-3

Wanted: Medical technician preferably with degree in biochemistry for northwestern clinic of 25 doctors maintaining clinical laboratory in hospital averaging 155 patients daily. Town of 30,000. $300 and more for exceptionally well qualified individual. AJT8-7

Laboratory-X-Ray Technician: Ninety bed modern approved hospital in West Coast city of 20,000. $300. AJT8-8

Laboratory Technician: Qualified in hematology to head private laboratory of highly qualified doctor specializing in Internal Medicine. Modern university city of 200,000. $300. AJT8-9

Wanted: X-Ray Technician for 160 bed hospital in town of 15,000 short distance from Rio Valley. $250. AJT8-10

Laboratory X-Ray Technician: 90 bed approved hospital with complete modern facilities. West Coast port of 20,000. $300 AJT8-11

X-Ray Technician: Prefer female with some therapy experience for five man clinic located in southern town of 25,000. Unusually attractive opportunity. AJT8-12

ANN WOODWARD, DIRECTOR — **185 North Wabash Avenue**